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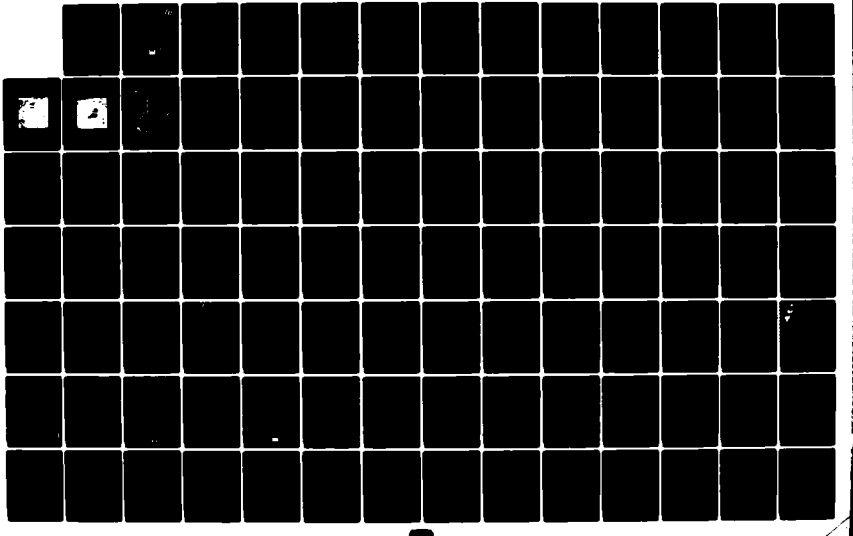

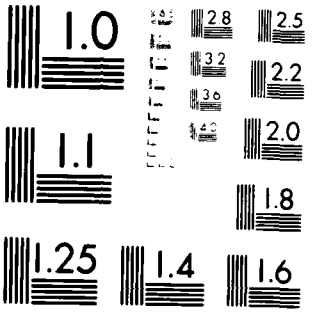

CONNECTICUT RIVER BASIN
CHICOPEE, MASSACHUSETTS

UPPER BEMIS POND DAM
MA00069

LOWER BEMIS POND DAM
MA 00531

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

OCTOBER 1980

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: MA 00069 MA 00531
2. GOVT ACCESSION NO.:
3. RECIPIENT'S CATALOG NUMBER:

4. TITLE (and Subtitle):
Upper Bemis Pond Dam/Lower Bemis Pond Dam
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS

5. TYPE OF REPORT & PERIOD COVERED: INSPECTION REPORT

6. PERFORMING ORG. REPORT NUMBER:

7. AUTHOR(s):
U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DIVISION

8. CONTRACT OR GRANT NUMBER(s):

9. PERFORMING ORGANIZATION NAME AND ADDRESS:

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:

11. CONTROLLING OFFICE NAME AND ADDRESS:
DEPT. OF THE ARMY, CORPS OF ENGINEERS
NEW ENGLAND DIVISION, NEDED
424 TRAPELO ROAD, WALTHAM, MA. 02254

12. REPORT DATE: October 1980

13. NUMBER OF PAGES: 125

14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office):

15. SECURITY CLASS. (of this report): UNCLASSIFIED

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT (of this Report)
APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES
Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)
DAMS, INSPECTION, DAM SAFETY,

Connecticut River Basin
Chicopee, Massachusetts

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
Upper Bemis Pond Dam is a 335 foot long earth dam. Lower Bemis Pond Dam is a 290 foot long earth dam. Upper Bemis Dam has a maximum height of 18.4 feet and consists of an earth embankment, a flume, and 2 auxiliary spillways. Lower Bemis Dam has a maximum height of 33 feet and consists of an earth embankment, a drop inlet spillway, and an emergency spillway. They are both classified as small size and high hazard. The test range is from the ½ PMF to the full PMF.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:
NEDED

JAN 19 1981

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

Inclosed is a copy of the Upper Bemis Pond Dam (MA-00069) and Lower Bemis Pond Dam (MA-00531) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, City of Chicopee, Parks Department, 687 Front Street, Chicopee, MA 01013.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely,

WILLIAM E. HODGSON, JR.
Colonel, Corps of Engineers
Acting Division Engineer

Incl
As stated

UPPER BEMIS POND DAM MA 00069

LOWER BEMIS POND DAM MA 00531

CONNECTICUT RIVER BASIN
CHICOPEE, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION
PROGRAM

NATIONAL DAM INSPECTION
PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

Identification No. : MA 00069
MA 00531

Name of Dam: Upper Bemis Pond
Lower Bemis Pond

Town: Chicopee

County and State: Hampden County, Massachusetts

Stream: Abbey Brook, Tributary of the Chicopee River

Date of Inspection: July 15, 1980

Upper Bemis Pond Dam is a 335-foot long earth dam built in 1954 for recreation purposes. The dam has a maximum height of 18.4 feet and consists of an earth embankment, a flume which functions as the main spillway, and two auxiliary spillways. The top of the dam is at Elevation (El) 131.6 (National Geodetic Vertical Datum of 1929). The flume (main spillway) is 4.8 feet wide by 18.3 feet high, and is controlled by stop logs. The invert of the flume is at El 114.5. The auxiliary spillways are broad crested weirs, 7 feet long, with the crests at El 128.8.

Lower Bemis Pond Dam is a 290-foot long earth dam that was built in 1862 as an ice pond and modified in 1957 for recreational purposes. The dam has a maximum height of 33 feet and consists of an earth embankment, a drop inlet spillway containing a low level outlet, and an emergency spillway. The drop inlet is a 6-foot by 7-foot vertical concrete shaft that connects to a horizontal conduit of the same dimensions. It has a normal pool inlet at El 118.8 and a high flow inlet at El 125.3. The low level outlet enters the drop inlet at El 110.3. The top of the dam is at El 135.5. The emergency spillway is an ogee crested weir 9.0 feet long with the crest at El 126.9.

Upper Bemis Pond is located 370 feet upstream from Lower Bemis Pond. The water impounded by Lower Bemis Pond submerges a portion of the downstream slope of the upper dam. The top of the embankment of the upper dam is 2.9 feet below the top of the lower dam.

There are deficiencies which must be corrected to assure the continued performance of these dams. This conclusion is based

on the visual inspection of the sites and a review of the available data. Generally the dams are in fair condition.

The following deficiencies were observed:

Upper Bemis Pond Dam; tilting of the walls of the left spillway; erosion of the embankment slopes adjacent to the flume and spillways and erosion at the downstream end of the left spillway; cracked and spalled concrete of the flume and spillway walls; an accumulation of debris in the flume and numerous animal burrows in the embankment.

Lower Bemis Pond Dam; numerous animal burrows in the slopes; erosion of the upstream slope in the vicinity of the outlet; severely spalled concrete on the walls and floor of the spillway; severe leakage from the sluice gate of the low level outlet; heavy growth of trees and brush near the downstream toe of the dam; wood and debris accumulated in the downstream channel and trees and brush overhanging the downstream channel.

Based on Corps of Engineers' guidelines, Upper Bemis Pond Dam has been classified in the small size and high hazard categories. Accordingly, a test flood ranging from 1/2 the probable maximum flood (PMF) to the full PMF should be used to evaluate the capacity of the spillway. Because of the small drainage area contributing to Upper Bemis Pond Dam, the 1/2 PMF value was selected. The test flood outflow is 885 cfs, resulting in a pond level at El 132.1. The test flood would overtop the dam by 0.5 feet. Hydraulic analyses indicate that the flume (without stop logs) and spillways combined can discharge 835 cfs or 93 percent of the test flood outflow before the dam is overtopped. With stop logs in the flume, the combined outlets can discharge 770 cfs or 87 percent of the test flood overflow before the dam is overtopped.

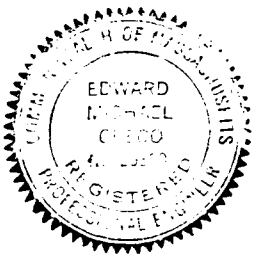
Based on the Corps of Engineers' guidelines, Lower Bemis Pond Dam has also been classified in the small size and high hazard categories. Accordingly, a test flood ranging from the 1/2 PMF to the full PMF should be used to evaluate the capacity of the spillway. Because of the small size of the dam, the 1/2 PMF value was selected. The test flood outflow is 940 cfs, resulting in a pond level at El 130.0. Hydraulic analyses indicate that the outlet can discharge 740 cfs or 79 percent of the test flood outflow with the pond at El 130.0. The spillway could discharge an additional 220 cfs at the same elevation. With stoplogs in the flume, the combined outlets can discharge 2,847 cfs or 302 percent of the test flood therefore, the dam would not be overtopped.

It is recommended that the Owner employ a qualified registered professional engineer to conduct a more detailed hydraulic and hydrologic study of the flume and overtopping

UPPER BEMIS POND DAM
LOWER BEMIS POND DAM

potential at Upper Bemis Pond Dam as well as the culvert at Front Street. In addition, the Engineer should be employed to develop procedures for removing brush and trees, and backfilling for a distance of 25 feet downstream of the toe of Lower Bemis Pond Dam. In addition, the Owner should repair the deficiencies listed above, and as described in Section 7.3. The Owner should also implement a program of annual technical inspections, a plan for surveillance of the dam during and after periods of heavy rainfall, and a plan for notifying downstream residents in the event of an emergency at the dam.

The measures outlined above and in Section 7 should be implemented by the Owner within a period of one year after receipt of this Phase I Inspection Report.



Edward M. Greco, P.E.
Project Manager
Metcalf & Eddy, Inc.

Massachusetts Registration
No. 29800

Approved by:

Stephen L. Bishop

Stephen L. Bishop, P.E.
Vice President
Metcalf & Eddy, Inc.

Massachusetts Registration
No. 19703

This Phase I Inspection Report on Upper and Lower Bemis Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in Recommended Guidelines for Safety Inspection of Dams, for a Phase I Investigation. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general conditions and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed

to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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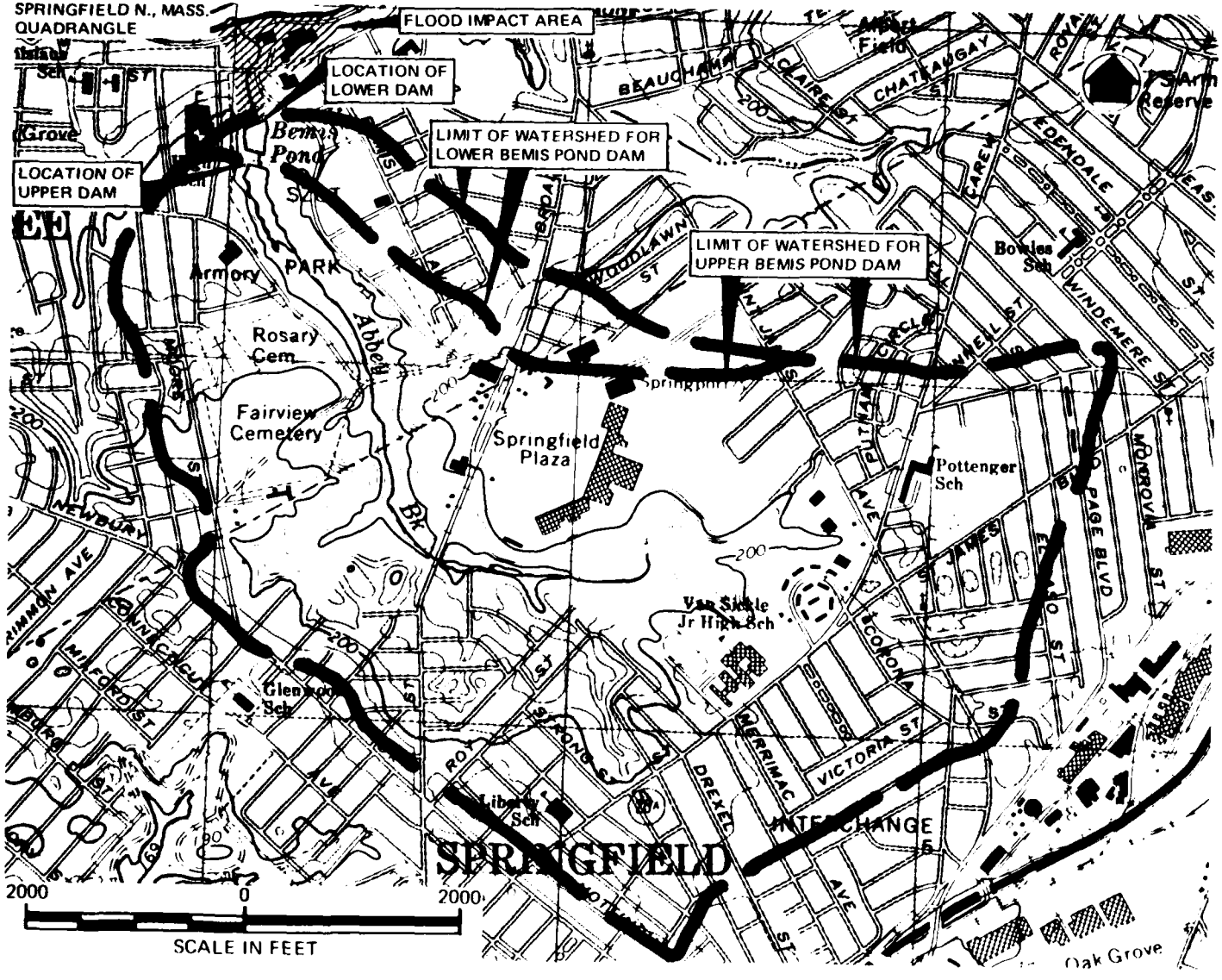
UPSTREAM OVERVIEW
UPPER BEMIS POND DAM
LOWER BEMIS POND DAM
CHICOPEE, MASSACHUSETTS

DOWNSTREAM OVERVIEW
UPPER BEMIS POND DAM
LOWER BEMIS POND DAM
CHICOPEE, MASSACHUSETTS



LOCATION MAP – UPPER BEMIS POND DAM,
LOWER BEMIS POND DAM

NATIONAL DAM INSPECTION
PROGRAM

PHASE I INSPECTION REPORT

UPPER AND LOWER BEMIS POND DAMS

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Metcalf & Eddy, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Contract No. DACW 33-80-C-0054, dated April 18, 1980, has been assigned by the Corps of Engineers for this work.

b. Purpose.

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to quickly initiate effective dam safety programs for non-Federal dams.

(3) Update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. The dams are located on Abbey Brook, about 700 feet upstream of the confluence with the Chicopee River, in the Connecticut River Basin. The dams are in the City of Chicopee, Hampden County, Massachusetts (see Location Map). The coordinates of Upper Bemis Pond Dam are latitude 42 deg. 8.7 min. north and longitude 72 deg. 35.4 min. west and the coordinates of Lower Bemis Pond Dam are latitude 42 deg. 8.8 min. north and longitude 72 deg. 35.4 min. west.

b. Description of Dam and Appurtenances

Upper Bemis Pond Dam:

Upper Bemis Pond Dam is a 335-foot long earthfill dam with a maximum height of 18.4 feet (see Plan of Dam and Sections in Appendix B and photographs in Appendix C). The top of the dam is 15 feet wide and varies from El 131.6 to 132.9. The upstream and downstream faces are 2:1 (horizontal to vertical) slopes covered with grass. Available drawings indicate that the dam is an unzoned embankment (see Figure B-7). The foundation for the dam is unknown.

A concrete flume, which is centrally located in the dam, acts as the main spillway for transmitting flow from Upper Bemis Pond to Lower Bemis Pond. The flume is a level flat bottomed channel 4.6 feet wide with an invert at El 114.5. Wooden stop logs 5 feet high are mounted in slots in the flume walls. The vertical concrete walls are braced approximately half way between the invert and the top of the dam with nine 12-inch square concrete struts. At the crest of the dam, the flume is covered with precast concrete slabs. Remnants of an abandoned chlorination system are visible.

The auxiliary spillways, located near the ends of the dam, are 7-foot long, broad-crested concrete weirs. The approach channels consist of the upstream slope of the dam. Neither spillway has any controls. The crests of the spillways are at El 128.8, and El 128.7 (see Figure B-1).

The discharge channel below the spillways consists of the downstream slope of the dam. Lower Bemis Pond is at the toe of the dam.

Lower Bemis Pond Dam:

Lower Bemis Pond Dam, which is located 370 feet downstream of Upper Bemis Pond Dam, is a 290-foot long earthfill dam with a maximum height of 33 feet (see Plan of Dam and Sections in Appendix B and photographs in Appendix C). The top of the dam is 13 feet wide and varies from El 135.5 to El 136.6. A chain-link fence is located on the top of the dam. The upstream and downstream faces are 2:1 (horizontal to vertical) slopes covered with grass. Available drawings indicate that the dam is a zoned embankment with an impervious earth core containing two concrete seep rings around the outlet conduit. It is not known what the dam is founded on.

The inlet, lower inlet and low level outlet are a combined structure centrally located in the dam. The inlet which functions as the main spillway is a concrete drop inlet structure 6 feet by 7 feet in plan that connects to a horizontal conduit of the same dimensions. The upper level inlet consists of openings on three sides of the rectangular drop inlet structure. The three openings provide some 20 feet of overflow weir at El 125.3.

The lower inlet opening is at El 118.8 and is 2.4 feet high by 3.5 feet wide and is located on the upstream face of the drop inlet structure. The upper opening is unguarded and the lower one is protected by a steel grate. The horizontal conduit is 88.3 feet long from the backwall of vertical section to the discharge opening and slopes at 2 percent.

The emergency spillway, located at the eastern end of the dam, is a 10-foot long, ogee-crested concrete weir. The crest of the spillway is at El 126.9. The approach channel consists of vertical concrete wingwalls and a concrete floor. Although there were slots for stop logs in the sidewalls, at the time of the inspection no stop logs were in place.

The discharge channel below the emergency spillway is 11 feet wide at the weir and 6.0 feet wide at the discharge end. The sides are 5-foot high concrete walls for a distance of 75 feet downstream of the weir. The floor of the channel is lined with concrete and slopes at 22 percent.

The low level outlet which discharges into the inlet structure is provided with a 16-inch sluice gate located within the drop inlet structure. The invert of the discharge end of the low level outlet is at El 110.3. Flow into the inlet is controlled manually by a hand wheel operator located on the deck above the drop outlet. Access to the deck from the top of the dam is by an access bridge constructed with steel I-beams and wood decking. The bridge is supported by a concrete pier on the dam and by the outlet structure. Concrete stairs lead down from the top of the dam to the bridge.

c. Size Classification. Upper Bemis Bond Dam has a maximum height of 18.4 feet and a maximum storage capacity of 80 acre-feet. The storage capacity places this dam in the "small" size category which ranges from 50 to 1,000 acre-feet.

Lower Bemis Pond Dam has a maximum height of 33 feet and a maximum storage capacity of 80 acre-feet. The storage capacity places this dam in the "small" category.

d. Hazard Classification. In the event of a possible failure of Upper Bemis Pond Dam, no property damage or loss of life is expected to occur because of the size and proximity of Lower Bemis Pond Dam. Accordingly Upper Bemis Pond Dam has been placed in the "low" hazard category.

The Front Street roadway embankment is located 260 feet downstream of Lower Bemis Pond Dam (see Flood Impact Area shown on the Location Map). Approximately 200 feet downstream of Front Street is an electrical generating station and a maintenance shop. The foundations of these structures are approximately 5 feet above the floor of the channel. An assumed failure of the lower dam would result in a flood 24 feet high 260 feet downstream of the dam and overtopping of Front Street by 2.8 feet. During the 1955 storm the Front Street embankment failed. It is possible that more than a few lives could be lost and a large amount of property damage could occur. Accordingly, the lower dam has been placed in the "high" hazard category.

e. Ownership. The dams are owned by the City of Chicopee, Parks Department, 687 Front Street, Chicopee, Massachusetts 01013. Mr. Armand P. Fortin (telephone 413-592-5167) granted permission to enter the property and inspect the dams.

f. Operation. The dams are operated by personnel from the Chicopee Parks Department.

g. Purpose of the Dam. Upper and Lower Bemis Ponds are currently only used for boating. The original purpose of Lower Bemis Pond was an ice pond. In the early 1950's the town decided to create Lower Bemis Pond as a swimming pool. As part of the improvements, Upper Bemis Pond Dam was constructed to form a settling basin for streamflow prior to entering Lower Bemis Pond. The project proved unsuccessful and was abandoned in favor of a conventional swimming pool built elsewhere in Spot Park.

h. Design and Construction. Construction of Upper Bemis Pond Dam was completed in 1954. Drawings dated February 16, 1954 and prepared by Gordon E. MacNeill Associates are available. The drawings show that the dam was constructed essentially as it appears today, except that the footbridges over the auxiliary spillways were removed and the slopes do not conform to the drawings.

Subsequent inspection reports indicate that since construction the dam has been in fair condition. However, shortly after the dam was constructed some repair was necessary in areas where the embankment had slouched. Since then no repairs have been made.

Construction of Lower Bemis Pond Dam was completed in 1862. No drawings or specifications for this original construction are available. A drawing dated October 7, 1953 prepared by Gordon E. MacNeill shows how the dam appeared in 1953. Drawings for repair work to Lower Bemis Pond Dam prepared by Tighe and Bond, Consulting Engineers and dated June 1957 are also available. These drawings depict the dam essentially as it appears today.

Previous inspection reports indicate that with the exception of a seven-year period following repairs in 1957 the dam has been in fair to poor condition. The repairs were made to the downstream slope adjacent to the spillway damaged by the 1955 storm. At that time a combination intake structure-low level outlet was constructed which replaced a 16-inch diameter low level outlet. Other repairs or modifications have included lowering the spillway crest 3-1/2 feet in 1935 to its present elevation and the periodic clearing of brush from the embankment.

i. Normal Operating Procedures. Personnel from Chicopee Parks Department reportedly visit the dam once a week. During the inspection the dams are checked for vandalism or other problems. The stop logs at the upper dam are presently kept at El 119.5. The low level outlet at the lower dam was last reported operated approximately five years ago when the pond was lowered prior to an anticipated storm.

1.3 Pertinent Data

a. Drainage Area. The combined drainage area of the two ponds includes approximately 813 acres (1.3 square miles) and consists of gently rolling land (see Figure D-1 in Appendix). The drainage area for Lower Bemis Pond includes drainage from Upper Bemis Pond and direct drainage amounting to 14 acres. In general, the undeveloped portions of the drainage area consist of grassed hillsides forming Szot Park. Dense residential development generally occurs on either side of Abbey Brook outside the limits of Szot Park.

b. Discharge.

Upper Bemis Pond Dam:

Discharge from Upper Bemis Pond Dam flows over the stop logs in the flume and into Lower Bemis Pond located immediately downstream. When the pond level reaches about El 127.8 water also discharges from the two auxiliary spillways into Lower Bemis Pond.

(1) Outlet: N/A.

(2) Maximum known flood at damsite: Unknown.

(3) Ungated flume capacity at top of dam: 835 cfs at El 131.6.

(4) Ungated flume and 2 auxiliary spillways capacity at test flood elevation: without stoplogs 895 cfs at El 131.9, with stoplogs 885 cfs at El 132.1.

(5) Gated spillway capacity at normal pool elevation: N/A.

(6) Gated flume capacity at test flood elevation: N/A

(7) Total capacity at test flood elevation: 895 cfs at El 131.9.

(8) Total project discharge at top of dam elevation: 835 cfs at El 131.6.

(9) Total project discharge at test flood elevation: 895 cfs at El 131.9.

Lower Bemis Pond Dam:

Under normal conditions discharge from Lower Bemis Pond flows through the lower opening in the inlet located at El 118.8. When the reservoir level rises above El 125.3 water also discharges over the weir into the inlet. At levels above El 126.9 water also discharges over the emergency spillway and into the concrete-lined discharge channel.

(1) Outlet: Size - 16 in. dia. Invert El - 110.3. Discharge capacity at top of dam - 15 cfs.

(2) Maximum known flood at damsite: Unknown.

(3) Ungated spillway capacity at top of dam: 922 cfs at El 135.5

(4) Ungated spillway capacity at test flood elevation: 220 cfs at El 130.

(5) Gated spillway capacity at normal pool elevation: N/A.

(6) Total inlet capacity at test flood elevation: 720 cfs at El 130.

(7) Total spillway capacity at test flood elevation: 220 cfs at El 130.

(8) Total project discharge at top of dam elevation: cfs at El 135.5

(9) Total project discharge at test flood elevation: 955 cfs at El 130.

c. Elevation (Feet above National Geodetic Vertical Datum of 1929 (NGVD)). A bench mark was established at El 132.9 on the concrete crest of Lower Bemis Pond Dam inlet. This elevation was estimated from a United States Geological Survey (U.S.G.S.) topographic map.

Upper Bemis Pond Dam:

(1) Streambed at toe of dam: 114.5.

(2) Bottom of cutoff: None.

(3) Maximum tailwater: Unknown.

(4) Normal pool: 119.5.

(5) Full flood control pool: N/A.

(6) Flume crest (top of stop logs): 119.5.
Auxiliary Spillways: 128.8 and 128.7

(7) Design surcharge (Original design): Unknown.

(8) Top of dam: 131.6.

(9) Test flood surcharge: 132.1.

Lower Bemis Pond Dam:

(1) Streambed at toe of dam: 103.6 (downstream).

(2) Bottom of cutoff: Unknown.

(3) Maximum tailwater: Unknown.

(4) Normal pool: 118.8.

(5) Full flood control pool: N/A.

(6) Emergency spillway crest (ungated): 126.9.
Inlet spillway crest: 125.3.

(7) Design surcharge (Original design): Unknown.

(8) Top of dam: 135.5to 136.6

(9) Test flood surcharge: N/A.

d. Reservoir (Length in Feet).

Upper Bemis Pond Dam:

(1) Normal pool: 400

(2) Flood control pool: N/A

(3) Spillway crest pool: 2000

(4) Top of dam: 2500

(5) Test flood pool: 3300

Lower Bemis Pond Dam:

(1) Normal pool: 310

(2) Flood control pool: N/A

(3) Spillway crest pool: 340
Inlet crest pool: 330

(4) Top of dam: 4000

(5) Test flood pool: 3000

e. Storage (Acre-Feet).

Upper Bemis Pond Dam:

(1) Normal pool: 5

(2) Flood control pool: N/A

(3) Spillway crest pool: 38

(4) Top of dam: 80

(5) Test flood pool: 100

Lower Bemis Pond Dam:

(1) Normal pool: 22

(2) Flood control pool: N/A

(3) Spillway crest pool: 33
Inlet crest pool: 22

(4) Top of dam: 181

(5) Test flood pool: 67

f. Reservoir Surface (Acres).

Upper Bemis Pond Dam:

(1) Normal pool: 1

(2) Flood control pool: N/A

(3) Spillway crest: 9

(4) Test flood pool: 13

(5) Top of dam: 20

Lower Bemis Pond Dam:

(1) Normal pool: 2

(2) Flood control pool: N/A

(3) Spillway crest: 8
Inlet crest: 6

(4) Test flood pool: 15

(5) Top of dam: 23

e. Dam.

Upper Bemis Pond Dam:

(1) Type: Earth fill

(2) Length: 335 feet

(3) Height: 17 feet (log point, top of dam)

(4) Top width: 15 feet

(5) Side slopes: 2:1 (horizontal to vertical)

(6) Zoning: None

(7) Impervious core: None

(8) Cutoff: None

(9) Grout curtain: None

(10) Other: None

Lower Bemis Pond Dam:

(1) Type: Earth fill

(2) Length: 290 feet

(3) Height: 33 feet

(4) Top width: 13 feet

(5) Side slopes: 2:1 (horizontal to vertical)

(6) Zoning: Centrally located impervious core

(7) Impervious core: Unspecified impervious fill

(8) Cutoff: Unknown

(9) Grout curtain: Unknown

(10) Other: None

h. Diversion and Regulating Tunnel. N/A

i. Spillway.

Upper Bemis Pond Dam:

Flume:

(1) Type: Level concrete channel

(2) Length of weir: 4.6 feet

(3) Crest elevation - Top of stop logs (max.): 12[illegible]
Top of stop logs (normal): 119.[illegible]
No stop logs: 114.5

(4) Gates: None

(5) Upstream channel: Submerged

(6) Downstream channel: Submerged by Lower Bemis Pond

(7) General: None

Auxiliary spillways:

(1) Type: Broad crested weirs

(2) Length of weirs: 7 feet

(3) Crest elevations: 128.8 and 128.7

(4) Gates: None

(5) Upstream channel: Upstream dam embankment - Grass

(6) Downstream channel: Downstream dam embankment - Grass

(7) General: None

Lower Bemis Pond Dam:

Inlet spillway:

(1) Type: Vertical concrete box drop inlet and horizontal shaft

(2) Length of weir: Upper 20 feet, lower 3.5 feet

(3) Crest elevation: Lower 118.8, upper 125.3

(4) Gates: None

(5) Upstream channel: Submerged

(6) Downstream channel: Riprap floor for 50 feet

(7) General: None

Emergency spillway:

(1) Type: Ogee crested weir

(2) Length of weir: 10 feet

(3) Crest elevation: 126.9, no flashboards

(4) Gates: None

(5) Upstream channel: Upstream slope of dam - grassed

(6) Downstream channel: Concrete-lined box channel

(7) General: None

j. Regulating Outlets.

Upper Bemis Pond Dam: N/A

Lower Bemis Pond Dam:

(1) Invert El: 110.3

(2) Size: 16 in.

(3) Description: Manually operated sluice gate

(4) Control mechanism: Gate stem on deck above gate

(5) Other: Low level outlet.

SECTION 2

ENGINEERING DATA

2.1 General. The engineering data available for the Phase I inspection of Upper Bemis Pond Dam includes drawings dated October 1953 and February 1954 prepared by Gordon E. MacNeill Associates (see Figures B-5 through B-8) and for Lower Bemis Pond Dam includes drawings dated June 1957 by Tighe and Bond (see Figures B-9 through B-11). The drawings were obtained from the Hampden County Engineers Office. There are no other drawings, specifications, or computations available from the Owner, State, or County agencies for either dam. Selected copies of previous inspection reports for the dams dated 1968 to 1969 prepared by the Hampden County Commissioners are included in Appendix B. The most recent inspections of the dams were conducted in 1977 by the Massachusetts Department of Public Works. Copies of these reports are also given in Appendix B.

We acknowledge the assistance and cooperation of personnel from the Massachusetts Department of Environmental Quality Engineering, Division of Waterways; the Massachusetts Department of Public Works; and the Hampden County Engineers Office. In addition, we acknowledge the assistance of Mr. Armand P. Fortin and Mr. Roger LaPlante of the Chicopee Parks Department who provided information on the history and operation of the dams.

2.2 Construction Records. There are no construction records or as-built drawings available for the dams or appurtenances. Previous inspection reports by the Hampden County Commissioners and the Massachusetts Department of Public Works provided a limited summary of repairs and past construction changes at the two sites.

2.3 Operating Records. No operating records are available for either dam, and there is no daily record kept of the elevation of the pools or rainfall at the dam sites.

2.4 Evaluation

a. Availability. There is limited engineering data available for these dams.

b. Adequacy. The lack of detailed hydraulic, structural and construction data did not allow for a definitive review of either dam. Therefore, the evaluation of the adequacy of these dams is based on the visual inspection, past performance history, and engineering judgment.

c. Validity. Comparison of the available drawings with the field survey conducted during the Phase I inspection indicates that with the exception of the discrepancy in the inclination of the slopes at Upper Bemis Pond Dam the available information is valid.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The Phase I inspections of the dams at Upper and Lower Bemis Ponds were performed on July 15, 1980. Copies of the inspection checklists are included in Appendix A. Previous inspections were conducted by the Hampden County Commissioners of Upper Bemis Dam from 19[illegible] to 1970, and of Lower Bemis Dam from 1926 to 1970. The Massachusetts Department of Public Works conducted inspections of both dams in 1972, 1975 and 1977. Selected copies of those reports are given in Appendix B. Selected photographs taken during our Visual Inspections are included in Appendix C.

b. Dam.

(1) Upper Bemis Pond Dam:

The dam is an earth fill structure with two auxiliary spillways and a centrally located flume which functions as the main spillway (see Photograph No. 2). There was no evidence of seepage on the downstream slope of the dam. The downstream toe of the dam was submerged by Lower Bemis Pond and seepage, if any, was not visible.

A 1-foot deep depression approximately 3 feet wide was observed on the downstream slope of the dam at the end of the left spillway. Presently, this depression is covered with grass (see Photograph No. 9).

Moderate erosion due to foot traffic was noted on the slopes of the dam adjacent to the flume and spillways (see Photograph No. 7).

There is no riprap on the upstream slope of the dam; however, there is an unpaved road along the right upstream toe and the upstream side is protected by concrete block riprap (see Photograph No. 1).

Many animal burrows were observed on the upstream and downstream slopes (see Photograph No. 10).

(2) Lower Bemis Pond Dam:

The dam is an earth fill structure with an emergency spillway and a drop inlet spillway that contains the low level outlet (see Photograph No. 11). There was no evidence of seepage at this dam. Many animal burrows were observed on both slopes. Brush and trees from 3 inches to 1 foot in diameter are growing at the downstream toe of the dam (see Photograph No. 18). The riprap placed at the toe of the dam between the spillway and the inlet appears to be intact although it is partially overgrown with weeds. There is no riprap on the remainder of the downstream toe or on the upstream slope.

c. Appurtenant Structures.

(1) Upper Bemis Pond Dam:

The flume (main spillway) is a flat-bottomed concrete channel with stop logs (see Photograph No. 5). At the time of the inspection, water was discharging through the flume, so the floor, stop logs, and downstream toe could not be examined (see Photograph No. 6). The concrete on the walls of the flume was in poor condition in localized areas. The top of the east wall has deteriorated to expose the reinforcing steel (see Photograph No. 4). There was a 1-1/2-inch deep casting void on the west wall that covered a 2-foot square area. The walkway over the flume is made of concrete slabs that are in fair condition with moderate spalling of the edges.

There are nine 12-inch square concrete struts bracing the walls and they were all in good condition (see Photographs No. 5 and 6).

The stop logs were submerged. The floor of the flume contained some rubbish and wood debris (see Photograph No. 6).

The concrete of the two auxiliary spillways is heavily spalled and is generally in poor condition. The heaviest spalling has occurred on the tops of the walls and the reinforcing steel is exposed. The sidewalls of the right spillway are vertical, and are supported face to face with steel I-beam struts (see Photograph No. 7). There are no struts in the

left spillway and consequently the walls are leaning inward by approximately 6 inches (see Photograph No. 8). Cracking of the left wall has also occurred.

(2) Lower Bemis Pond Dam:

The emergency spillway is an ogee crest weir without stop logs (see Photograph No. 16). The concrete on the crest of the spillway was in fair condition with only minor surficial spalling. However, the concrete on the upstream training walls and floor has spalled heavily, exposing the reinforcing steel in many places (see Photographs No. 15 and 17). The walkway over the spillway is in good condition and consists of a wood deck supported by steel I-beams.

The upper portions of the drop outlet were visible during inspection. As shown in Photograph No. 13, the inlet is in good condition. The bar rack at the lower inlet contained a small amount of debris which was not blocking the flow.

The low level outlet discharges into the inlet. The sluice gate on the low level outlet is reportedly in operating condition. A significant amount of leakage was observed from the top of the sluice gate, as shown in Photograph No. 14.

The concrete inlet conduit is in good condition. The joints are aligned and there is no spalling. The discharge end of the inlet is partially clogged with debris, and a moderate amount of flow was discharging at the time of inspection (see Photograph No. 18).

d. Reservoir Area. The reservoir area immediately surrounding the dams is undeveloped (see overview photograph). The dams are located in Scot Park which is in the City of Chicopee, Massachusetts. Residential development is located outside of the park boundaries. Most of the park land is grassed slopes with the remaining area comprised of roads and recreational facilities. There is little potential that future development will occur in the reservoir area.

e. Downstream Channel.

(1) Upper Bemis Pond Dam:

Both the flume and spillways discharge directly into Lower Bemis Pond.

(2) Lower Bemis Pond Dam:

The spillway and inlet discharge into the downstream channel. The earth slopes that form the sides of the channel are covered with a heavy growth of trees and brush (see Photograph No. 18). Drawings show that the floor of the channel is lined with riprap for a distance of 50 feet downstream of the toe of the dam; however, this riprap was not visible at the time of the inspection. There is a moderate accumulation of wood and debris on the floor of the channel (see Photograph No. 18).

About 260 feet downstream of the dam, a road embankment at Front Street crosses the channel and restricts the discharge from the dam. Water flows through the embankment in a 170-foot long, 48-inch diameter concrete culvert where it discharges into an open channel and a culvert for another 430 feet and then into the Chicopee River.

3.2 Evaluation. The Visual Inspections indicate that both dams are in fair condition. The stated deficiencies which must be corrected to assure the continued performance of these dams and measures to improve these conditions are outlined in Section 7.

SECTION 4

OPERATING AND MAINTENANCE PROCEDURES

4.1 Operating Procedures

a. General.

(1) Upper Bemis Pond Dam:

There are no operating facilities and no regular operating procedures for this dam. Personnel from the Chicopee Parks Department reportedly visit the dam once a week to check the structure.

(2) Lower Bemis Pond Dam:

According to the Chicopee Parks Department, the standard procedure for operating the dam is to maintain sufficient water in the pond for skating each winter.

b. Warning System. There is no warning system in effect for either of these dams.

4.2 Maintenance Procedures

a. General. The dams are generally adequately maintained. The Chicopee Parks Department is responsible for maintenance of the facilities. Periodic inspections of both dams by the Massachusetts Department of Public Works and the Hampden County Commissioners have been conducted in the past. Typical maintenance procedures have included repair of cracked or missing concrete, backfilling and reseeding eroded areas on the dams, clearing brush and trees from the slopes and discharge channel, clearing debris from the emergency spillway and inlet spillway and mowing the grass on the slopes.

b. Operating Facilities.

(1) Upper Bemis Pond Dam:

There are no operating facilities at the dam. The top of the stop logs is maintained at El 119.5.

(2) Lower Bemis Pond Dam:

Maintenance of the operating facilities at the dam consists of checking the sluice gate periodically.

In 1957, the existing low level outlet was replaced. The operating condition of the outlet works is checked periodically by the Owner.

4.3 Evaluation. There is a program for maintaining the embankments and appurtenant structures in operating condition. However, there is no program of regular technical inspections, plan for surveillance of the embankments during and after periods of heavy rainfall, or an emergency warning system in effect. This is undesirable, considering that Lower Bemis Pond Dam is in the high hazard category. This program should be implemented, as recommended in Section 7.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General. Upper Bemis Pond Dam has a drainage area of 1.85 square miles (see Location Map for Drainage Area). The land is gently rolling, and lightly developed.

There are no dams upstream of Upper Bemis Pond.

Upper Bemis Pond has a surface area of approximately 3 acres, and a maximum storage capacity of 80 acre-feet at El 131.5. There is no low level outlet at this dam except for the flume which has stop logs that can be adjusted to lower the pond to El 114.5.

Upper Bemis Pond Dam is located 370 feet upstream from Lower Bemis Pond.

Lower Bemis Pond Dam has a drainage area of 1.27 square miles (see Location Map for Drainage Area). The land is gently rolling, and lightly developed. Lower Bemis Pond has a surface area of approximately 1 acre, and a maximum storage capacity of 359 acre-feet at El 135.5. The low level outlet can discharge a flow of 15 cfs when the pond is at El 119.8 which is the invert of the lower outlet opening. At this pond elevation and with no additional inflow, the outlet can lower the pond by 1 foot in about two hours.

5.2 Design Data. There are no hydraulic or hydrologic computations available for the design of the flume and spillways at Upper Bemis Pond Dam or of the outlet and spillway at Lower Bemis Pond Dam.

5.3 Experience Data. There is no record of overtopping of either dam. Representatives of the Chicopee Parks Department recall that during the 1955 storm, discharge from the emergency spillway at Lower Bemis Pond Dam caused some damage to the downstream slope of the dam and contributed to failure of the roadway embankment at Front Street.

5.4 Test Flood analysis

a. Upper Bemis Pond Dam. Upper Bemis Pond Dam has been classified in the "small" size and "high" hazard categories. According to the Corps of Engineers Guidelines, a test flood ranging from the 1/2 PMF

(Probable Maximum Flood) to the full PMF should be used to evaluate the capacity of the spillway. The 1/2 PMF test flood was selected due to the small size of the pond.

The PMF rate for the Upper Bemis Pond watershed was calculated to be 1,650 cfs per square mile of drainage area. This calculation is based on the average slope of 1.2 percent in the drainage area and the U.S. Army Corps of Engineers' guide curves for Maximum Probable Flood Peak Flow Rates (dated December 1977). For this analysis, the peak flow rate was determined to be between the guide curve for flat and coastal and rolling topography.

Applying the 1/2 PMF rate to the 1.25 square mile drainage area results in a peak test flood inflow of 1,030 cfs. By adjusting the test flood inflow for surcharge storage, the peak test flood outflow was calculated to be 885 cfs (708 cfs per square mile).

Without stop logs in the flume and assuming that the pond level is at El 118.8, the pond level would rise to El 131.9. With stop logs to El 119.5, the pond would rise to El 132.1.

Hydraulic analyses indicate that the flume without stop logs and the two auxiliary spillways can discharge 835 cfs or 93 percent of the test flood outflow with the pond at El 131.6, which is the low point on the top of the dam. With stop logs in the flume to El 119.5, the flume and the two auxiliary spillways could discharge 770 cfs or 87 percent of the outflow before the dam is overtopped.

Table 5-1 below summarizes the discharge from the pond during the test flood.

TABLE 5-1
DISCHARGE DATA FOR UPPER BEMIS POND DAM

	Stop logs in place	Stop logs removed
Maximum height of water above dam, ft:	0.5	0.3
Discharge through flume and spillways, cfs:	770	835
Discharge over dam, cfs:	115	60
Depth of critical flow over dam, ft:	0.3	0.2
Velocity at critical flow, fps:	3.1	2.4

b. Lower Bemis Pond Dam. Lower Bemis Pond Dam has been classified in the "small" size and "high" hazard categories. According to the Corps of Engineers Guidelines, a test flood ranging from 1/2 the PMF (Probable Maximum Flood) to the full PMF should be used to evaluate the capacity of the spillway. The 1/2 PMF was selected for this analysis based on the small storage capacity of the pond.

The PMF rate for the Lower Bemis Pond watershed was calculated to be 1,650 cfs per square mile of drainage area. This calculation is based on the average slope of 1.2 percent in the drainage area and the U.S. Army Corps of Engineers' guide curves for Maximum Probable Flood Peak Flow Rates (dated December 1977). For this analysis, the peak flow rate was determined to be between the guide curve for flat and coastal and rolling topography.

Applying the 1/2 PMF rate to the 1.27-square mile drainage area results in a peak test flood inflow of 1,050 cfs. By adjusting the test flood inflow for surcharge storage, the peak test flood outflow was calculated to be 940 cfs (740 cfs per square mile).

During the test flood (1/2 PMF) the pond level would rise to El 130.0.

Hydraulic analyses indicate that the combined outlets can discharge 2,847 cfs or 302 percent of the test flood with the pond at El 135.5 which is the low point on top of the dam. Therefore, the test flood would not overtop the dam.

5.5 Dam Failure Analysis

a. Lower Bemis Pond Dam. The peak discharge rate due to failure of the dam was calculated to be 8,430 cfs with the pond at El 130. This calculation is based on a maximum head of 26.4 feet and an assumed 37-foot wide breach occurring in the embankment between the outlet and the spillway. Failure of the dam would produce a downstream flood 24.4 feet deep as compared with flow 22 feet deep prior to failure. In either case the Front Street roadway embankment would be overtopped.

The Front Street roadway embankment is located 260 feet downstream of the dam. During the 1955 storm the Front Street roadway embankment failed. In the event of a failure of Lower Bemis Pond Dam, it is possible that the Front Street embankment could fail again.

The Chicopee Electric Light Company generating station and a large maintenance shop are located downstream of the Front Street embankment. Due to the short distance between the dam and these structures and the configuration of the channel, little attenuation of the flood flow is expected. An assumed failure of the dam and roadway embankment could result in a flood flow 12 feet deep at the generating station and shop which could result in the possible loss of more than a few lives and an excessive amount of property damage. Accordingly, the dam has been placed in the "high" hazard category.

b. Upper Bemis Pond Dam. The peak discharge rate due to failure of the dam was calculated to be 1,085 cfs with the pond at El 132.1. This calculation is based on a maximum head of 17.6 feet and an assumed 35-foot wide breach occurring in the western half of the embankment. Failure of the dam would raise the level of Lower Bemis Pond 2.3 feet from El 129.9 to El 132.2. The dam has been placed in the "low" hazard category based on the proximity of the two dams and on the assumption that the failure of Upper Bemis Pond Dam would result in no property damage or loss of life.

SECTION 6

STRUCTURAL STABILITY

6.1 Visual Observations. The evaluation of the structural stability of Upper Bemis Pond Dam and Lower Bemis Pond Dam is based on a review of previous inspection reports, a review of available drawings, and the Visual Inspection conducted on July 15, 1980.

As discussed in Section 3, Visual Inspection, the dams are in fair condition. No seepage or settlement was observed at either embankment. Areas of erosion were observed on the slopes of the dams adjacent to the spillways and flume at Upper Bemis Pond and on the upstream slope of Lower Bemis Pond in the vicinity of the outlet. A moderate growth of trees and vegetation exist upstream of the left spillway of Upper Bemis Pond Dam. There is a heavy growth of trees and brush in the vicinity of the downstream toe of Lower Bemis Pond Dam.

6.2 Design and Construction Data. Construction of Upper Bemis Pond Dam was completed in 1954.

a. Upper Bemis Pond

Computations for design of the dam, spillway and outlet are not available.

Drawings dated October 1953 and February 1954 prepared by Gordon E. MacNeill Associates show the proposed construction of the dam (see Figures B-5 through B-8). The drawings show that the dam is an unzoned earth-fill embankment with an unspecified foundation. They also show the side slopes of the embankment are stepped both upstream and downstream and range from 1.5:1 at the top to 2:1 at the toe.

Specifications for construction of the dam are not available.

There is no information on the shear strength or permeability of the soil and/or rock materials of the embankment.

b. Lower Bemis Pond

Construction of Lower Bemis Pond Dam was completed in 1862 and was reconstructed in 1957. Computations for either the original construction or the reconstruction are not available.

Drawings dated June 1957 prepared by Tighe and Bond Engineers show the proposed reconstruction of the dam (see Figures B-9 through B-11). The drawings show that the dam is a zoned earth-fill embankment with an unspecified foundation. An impervious core is located in the center of the embankment. The remaining earth fill is shown as pervious and semipervious materials on the drawings. The side slopes of the embankment are 2:1 upstream and 2:1 downstream.

Specifications for construction of the dam are not available.

There is no information on the shear strength or permeability of the soil and/or rock materials of the embankment.

6.3 Post Construction Changes

a. Upper Bemis Pond Dam. No changes have been made since the original construction of Upper Bemis Pond Dam. Repairs have been limited to regrading the downstream slope shortly after construction.

b. Lower Bemis Pond Dam. In 1936 the spillway lowered 3-1/2 feet to its present elevation. Damage to the dam caused by the 1955 storm was repaired in 1957. This work included repair of the erosion of the downstream slope adjacent to the spillway and replacing the existing low level outlet with a combination drop inlet-low level outlet structure. This required reconstruction of a major portion of the dam embankment.

6.4 Seismic Stability. The dams are located in Seismic Zone No. 1, and in accordance with Corps of Engineers Guidelines do not warrant seismic analyses.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND
REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. As a result of the Visual Inspections, the review of available data, and limited information on operation and maintenance, the dams are considered to be in fair condition. The following deficiencies must be corrected to assure the continued performance of these dams:

(1) Upper Bemis Pond Dam:

Erosion on the slopes of the dam; tilting of the left spillway walls; cracked and missing mortar on the flume walls; spalled concrete on the walls of the flume and spillways; accumulation of debris in the flume and numerous animal burrows in the embankment.

The peak test flood (1/2 PMF) outflow is estimated to be 895 cfs with the pond at El 131.9 (assuming no stop logs in place). The test flood would overtop the low point on the dam by 0.3 feet. Hydraulic analyses indicate that the flume and spillways (without stoplogs) can discharge 835 cfs or 93 percent of the test flood outflow before the dam is overtopped. (With the stop logs in place to El 119.5, the spillway can discharge 770 cfs or 87 percent of the test flood outflow before the dam is overtopped.)

(2) Lower Bemis Pond Dam:

Numerous animal burrows on the slopes; erosion on the upstream slope in the vicinity of the inlet; severely spalled concrete on the walls and floor of the spillway; significant leakage from the sluice gate of the low level outlet; heavy growth of trees and brush near the downstream toe of the dam; wood and debris accumulated in the downstream channel and trees and brush overhanging the downstream channel.

The peak test flood (1/2 PMF) outflow is estimated to be 940 cfs with the pond at El 130.0. Hydraulic analyses indicate that the inlet and spillway can

discharge 100 percent of the test flood and that the dam will not be overtopped.

b. Adequacy. The lack of detailed design and construction data did not allow for a definitive review of either dam. Therefore, the evaluation of these dams is based on a review of available data, the Visual Inspection, past performance and engineering judgment.

c. Urgency. The recommendations and remedial measures outlined below should be implemented by the Owner within one year after receipt of this Phase I Inspection Report.

7.2 Recommendations. It is recommended that the Owner employ a qualified registered engineer to provide the following services:

Develop procedures for clearing brush and trees, and backfilling for a distance of 25 feet downstream of the toe of Lower Bemis Pond Dam.

The Owner should implement the recommendations of the Engineer.

Repair all spalled and deteriorated concrete on the flume and spillways at Upper Bemis Pond Dam and Lower Bemis Pond Dam in accordance with the recommendations of the Engineer.

Repair the leaning and cracked walls of the left spillway at Upper Bemis Pond Dam.

7.3 Remedial Measures

Operating and Maintenance Procedures. It is recommended that the Owner accomplish the following:

Upper Bemis Pond Dam:

(1) To prevent continued erosion, fill in eroded areas on the upstream and downstream face of the earth embankment portions of the dams.

(2) Remove debris caught in the flume.

(3) Institute a definite plan for surveillance of the flume and spillways during and after periods of heavy rainfall and a plan to warn people in downstream areas in the event of an emergency at the dam.

(4) Implement a systematic program of maintenance inspections. As a minimum, the inspection program should consist of a monthly inspection of the dam and appurtenances and be supplemented by additional inspections during and after severe storms. All repairs and maintenance should be undertaken in compliance with all applicable State regulations. The maintenance program should include removal of any debris caught on the spillway weirs or flume to prevent clogging.

(5) Technical inspections of the dam should be conducted on an annual basis.

Lower Bemis Pond Dam:

(1) To prevent continued erosion, fill in eroded areas on the upstream and downstream face of the earth embankment portions of the dams.

(2) Remove all brush, trees, debris and loose stone in the floor of the downstream discharge channel.

(3) Remove debris from the downstream end of the inlet conduit at Lower Bemis Pond.

(4) Institute a definite plan for surveillance of the inlet and spillway during and after periods of heavy rainfall and a plan to warn people in downstream areas in the event of an emergency at the dam.

(5) Implement a systematic program of maintenance inspections. As a minimum, the inspection program should consist of a monthly inspection of the dam and appurtenances and be supplemented by additional inspections during and after severe storms. All repairs and maintenance should be undertaken in compliance with all applicable State regulations. The maintenance program should include removal of any debris caught on the spillway or inlet weirs.

(6) Technical inspections of the dam should be conducted on an annual basis.

(7) Insure the operability of the low level outlet.

7.4 Alternatives. An alternative would be to remove the dams.

APPENDIX A

PERIODIC INSPECTION CHECKLIST

PERIODIC INSPECTION

PARTY ORGANIZATION

PROJECT UPPER BEMIS POND

DATE July 15, 1980

TIME 8:29

WEATHER Clear

W.S. ELEV. 119.5 U.S. 104.8 N.G.

PARTY:

1.	Bill Checci	Metcalf & Eddy, Inc. - Geotechnical
2.	Frank Gordon	Metcalf & Eddy, Inc. - Geotechnical
3.	Scott Nagel	Metcalf & Eddy, Inc. - Geotechnical
4.	Marie Nowak	Metcalf & Eddy, Inc. - Hydraulics
5.	Ed Greco	Metcalf & Eddy, Inc. - Geotechnical

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam	Nagel/Nowak/Greco	
2.	Spillway 1 (West)	Nagel/Nowak/Greco	
3.	Spillway 2 (Middle)	Nagel/Nowak/Greco	
4.	Spillway 3 (East)	Nagel/Nowak/Greco	
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECK LIST

PROJECT UPPER BEMIS POND DATE July 15, 1980

PROJECT FEATURE Dam NAME Scott Nagel

DISCIPLINE Geotechnical NAME Marie Nowak

d/s = downstream u/s = upstream

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	132.6
Current Pool Elevation	119.5
Maximum Impoundment to Date	Unknown
Surface Cracks	None
Pavement Condition	Unpaved crest with grass cover No erosion visible.
Movement or Settlement of Crest	None visible - adjacent to spillway side walls on crest there is light erosion
Lateral Movement	None
Vertical Alignment	Flat - dip at spillway #1
Horizontal Alignment	Straight
Condition at Abutment and at Concrete Structures	Abutments tie into natural ground. Erosion from foot traffic adjacent to spillway side walls.
Indications of Movement of Structural Items on Slopes	None - irregular u/s face possible slumping - right side
Trespassing on Slopes	Erosion-moderate to heavy - adjacent to spillway side walls.
Sloughing or Erosion of Slopes or Abutments	Some erosion has taken place d/s of spillway 1 lip-now grass covered
Rock Slope Protection - Riprap Failures	Grass slopes u/s & d/s-no brush or trees slopes appear to be mowed - no erosion evident. 4 levels of conc. curbs @ u/s toe.
Unusual Movement or Cracking at or near Toes	None-many animal burrows on u/s slope - only 1 or 2 on d/s slope
Unusual Embankment or Downstream Seepage	d/s toe submerged
Piping or Boils	None visible
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

PERIODIC INSPECTION CHECK LIST

PROJECT UPPER BEMIS POND DATE July 15, 1980

PROJECT FEATURE Spillway NAME Scott Nagel

DISCIPLINE Geotechnical NAME Marie Nowak

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	#1 (West)
a. Approach Channel	Grass covered slope of dam - some brush upstream
General Condition	Fair - relatively open
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Brush d/s partly obstructs direction of flow
Floor of Approach Channel	Grass covered u/s slope of dam
b. Weir and Training Walls	Concrete sidewalls and floor - no struts
General Condition of Concrete	Fair-walls leaning into channel-L/H wall top spalling-otherwise good-no cracking
Rust or Staining	None
Spalling	Heavy spalling top of wall L/H side
Any Visible Reinforcing	Rebar exposed by spalling on L/H wall
Any Seepage or Efflorescence	None
Drain Holes	None
c. Discharge Channel	Discharges onto d/s slope of dam then into Lower Bemis Pond
General Condition	Open - clear
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Channel	Grass covered-evidence of past erosion at lip - depression 1 ft. deep
Other Obstructions	None

PERIODIC INSPECTION CHECK LIST

PROJECT UPPER BEMIS POND DATE July 15, 1980

PROJECT FEATURE Spillway NAME Scott Nagel

DISCIPLINE Geotechnical NAME Marie Nowak

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	#2 (Middle)
a. Approach Channel	Stream impounded by dam
General Condition	Open & clear of obstructions
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Submerged but appears to be unlined
b. Weir and Training Walls	Vertical concrete walls-concrete struts-floor submerged - concrete slab roof
General Condition of Concrete	Fair to poor - surface has void as a result of casting-surfaces are pitted.
Rust or Staining	None-except where rebar is exposed
Spalling	Heavy along top of sidewalls at crest also along u/s stop log slots-minor*
Any Visible Reinforcing	Rebar exposed in R/H d/s top of sidewall
Any Seepage or Efflorescence	None
Drain Holes	None
c. Discharge Channel	Discharges directly into Lower Bemis Pond
General Condition	Submerged
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Channel	Submerged
Other Obstructions	None

***spalling in many areas.**
Stoplogs in place-some brush and debris trapped behind them.
Chlorine discharge holes (2) on R/H side (1) on L/H side.

PERIODIC INSPECTION CHECK LIST

PROJECT UPPER BEMIS POND DATE July 15, 1980

PROJECT FEATURE Spillway NAME Scott Nagel

DISCIPLINE Geotechnical NAME Marie Nowak

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	#3 (East)
a. Approach Channel	Grass covered slope of dam
General Condition	Open & clear of debris
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Grass covered u/s slope of dam
b. Weir and Training Walls	Vertical concrete walls supported with steel I-beams - concrete floor
General Condition of Concrete	Fair-spalling of top of R/H wall exposes rebar - some patching has been done
Rust or Staining	Rust stained walls from I-beam struts
Spalling	Spalling of R/H wall top
Any Visible Reinforcing	R/H wall top in spalled area
Any Seepage or Efflorescence	None
Drain Holes	None
c. Discharge Channel	Grass covered slope of dam
General Condition	Clear and open
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Channel	Grass covered d/s slope of dam discharges into Lower Bemis Pond
Other Obstructions	None

PERIODIC INSPECTION

PARTY ORGANIZATION

PROJECT LOWER BEMIS POND

DATE July 15, 1980

TIME 9:55

WEATHER Clear

W.S. ELEV. 119.5 U.S. 119.5 D.S.

PARTY:

1. Bill Checci — Metcalf & Eddy, Inc. - Geotechnical
2. Frank Gordon — Metcalf & Eddy, Inc. - Geotechnical
3. Scott Nagel — Metcalf & Eddy, Inc. - Geotechnical
4. Marie Nowak — Metcalf & Eddy, Inc. - Hydraulics
5. Ed Greco — Metcalf & Eddy, Inc. - Geotechnical

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam	Nagel/Nowak/Greco	
2.	Spillway	Nagel/Nowak/Greco	
3.	Outlet	Nagel/Nowak/Greco	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER BEMIS POND DATE July 15, 1980

PROJECT FEATURE Dam NAME Scott Nagel

DISCIPLINE Geotechnical NAME Marie Nowak

d/s = downstream
u/s = upstream

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	132.6
Current Pool Elevation	119.5
Maximum Impoundment to Date	Unknown
Surface Cracks	None
Pavement Condition	Crest is unpaved but has some gravel for part of its length
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Level
Horizontal Alignment	Straight
Condition at Abutment and at Concrete Structures	Abutments tie into hillsides. Heavy erosion from foot traffic adjacent to outlet and spillway.
Indications of Movement of Structural Items on Slopes	None - Very steep d/s slope - possible slumping
Trespassing on Slopes	U/s slope eroded all over from foot traffic D/s slope has 1 small channel
Sloughing or Erosion of Slopes or Abutments	Erosion as mentioned above-u/s slope has a irregular surface.
Rock Slope Protection - Riprap Failures	No riprap - u/s & d/s slopes grass covered
Unusual Movement or Cracking at or near Toes	None visible - d/s toe heavilly over-grown
Unusual Embankment or Downstream Seepage	None
Piping or Boils	None
Foundation Drainage Features	None visible
Toe Drains	None visible
Instrumentation System	None

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER BEMIS POND DATE July 15, 1980

PROJECT FEATURE Spillway NAME Scott Nagel

DISCIPLINE Geotechnical NAME Marie Nowak

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	U/s slope of dam
General Condition	Good - open - clear
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Grass covered
b. Weir and Training Walls	Wing walls & floor of concrete ogee weir*
General Condition of Concrete	Poor
Rust or Staining	None
Spalling	Heavy spalling of wing walls & spillway floor
Any Visible Reinforcing	Rebar exposed in areas of heavy spalling
Any Seepage or Efflorescence	No seepage - minor efflorescence
Drain Holes	None
c. Discharge Channel	Concrete box channel on d/s slope.
General Condition	Very poor-heavy spalling & cracking of walls & floor exposing rebar
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	One small tree partly overhangs.
Floor of Channel	Concrete-spalled-some weeds growing in concrete
Other Obstructions	Downstream channel is heavilly choked with brush, trees and debris.

*Spillway weir is covered by a timber deck supported by 7 I-beam struts.

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER BEMIS POND DATE July 15, 1980

PROJECT FEATURE Outlet NAME Scott Nagel

DISCIPLINE Geotechnical NAME Marie Nowak

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	Flooded by Lower Bemis Pond
Slope Conditions	Grass covered
Bottom Conditions	Submerged
Rock Slides or Falls	None
Log Boom	None
Debris	None visible
Condition of Concrete Lining	N/A
Drains or Weep Holes	None
b. Intake Structure	Vertical square concrete shaft with 3 inlets.
Condition of Concrete	Good. No cracking or spalling.
Stop Logs and Slots	None

Outlet has two levels:

1. Normal Pool level - which was discharging between 100 and 200 gpm at time of inspection.

2. Low level outlet - slide gate with operator on top of outlet.

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER BEMIS POND DATE July 15, 1980

PROJECT FEATURE Outlet NAME Scott Nagel

DISCIPLINE Geotechnical NAME Marie Nowak

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Concrete box structure through dam discharges onto stream channel at d/s toe.
General Condition of Concrete	Good no cracking or spalling
Rust or Staining	None
Spalling	None
Erosion or Cavitation	None
Visible Reinforcing	None
Any Seepage or Efflorescence	None
Condition at Joints	Intact
Drain Holes	None
Channel	Stream channel
Loose Rock or Trees Over-hanging Channel	Several trees some as big as 7"diam. and a lot of brush - no rock
Condition of Discharge Channel	Brush, debris & boulders resting in channel.

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER BEMIS POND DATE July 15, 1980

PROJECT FEATURE Outlet - Service Bridge NAME Scott Nagel

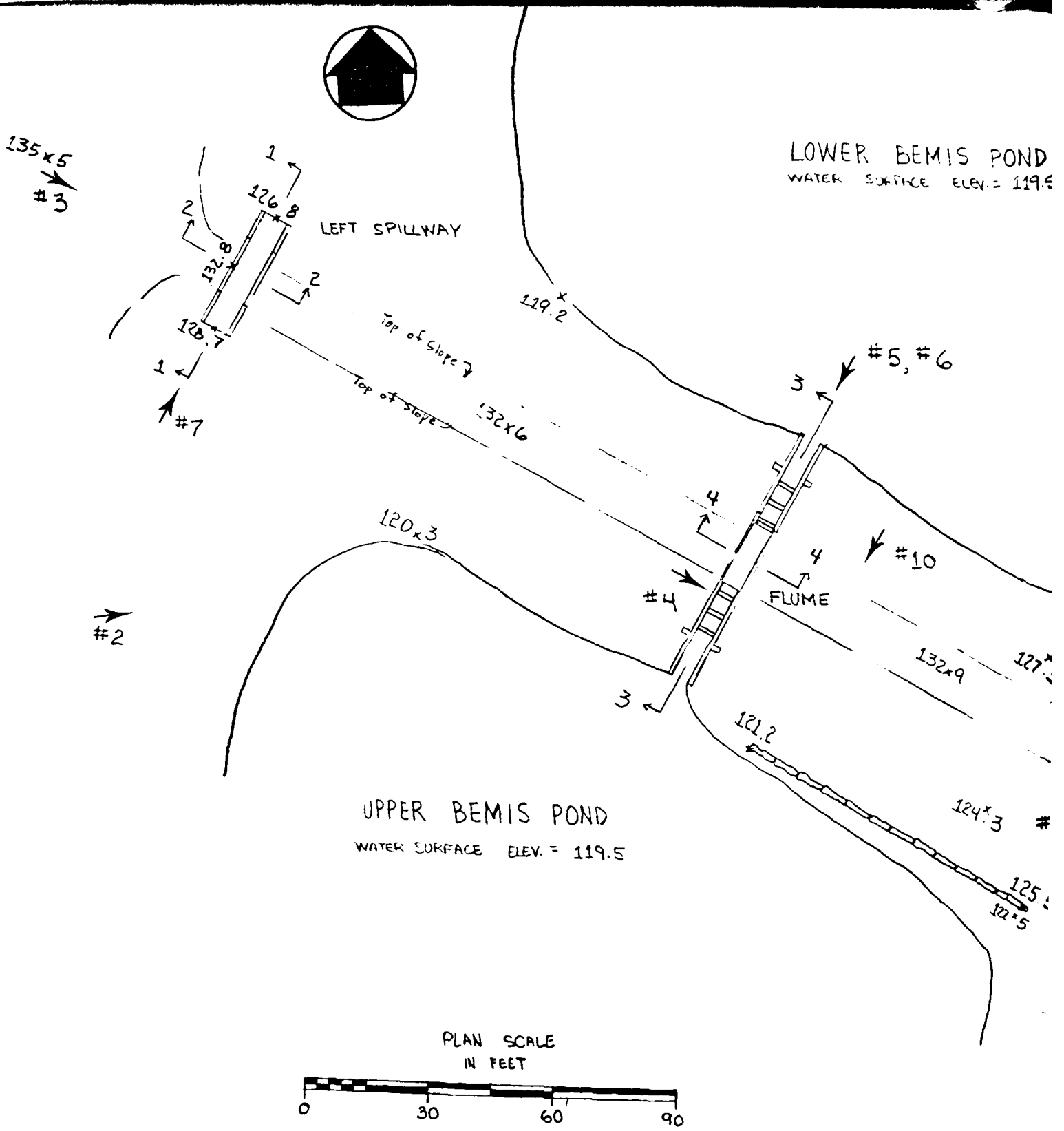
DISCIPLINE Geotechnical NAME Marie Nowak

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	None
Bearings	None
Anchor Bolts	None
Bridge Seat	Steel plates in abutment and outlet structure
Longitudinal Members	Steel I-beams
Under Side of Deck	Exposed
Secondary Bracing	None
Deck	Wood 2x6 planks - 3 feet wide
Drainage System	Between planks
Railings	None
Expansion Joints	None
Paint	None
b. Abutment and Piers	Concrete steps on embankment-outlet structure on other end
General Condition of Concrete	Good-no cracking or spalling
Alignment of Abutment	Good-no settlement
Approach to Bridge	Through locked gate on crest of dam.
Condition of Seat and Backwall	N/A

APPENDIX B

PLANS OF DAMS AND PREVIOUS INSPECTION REPORTS

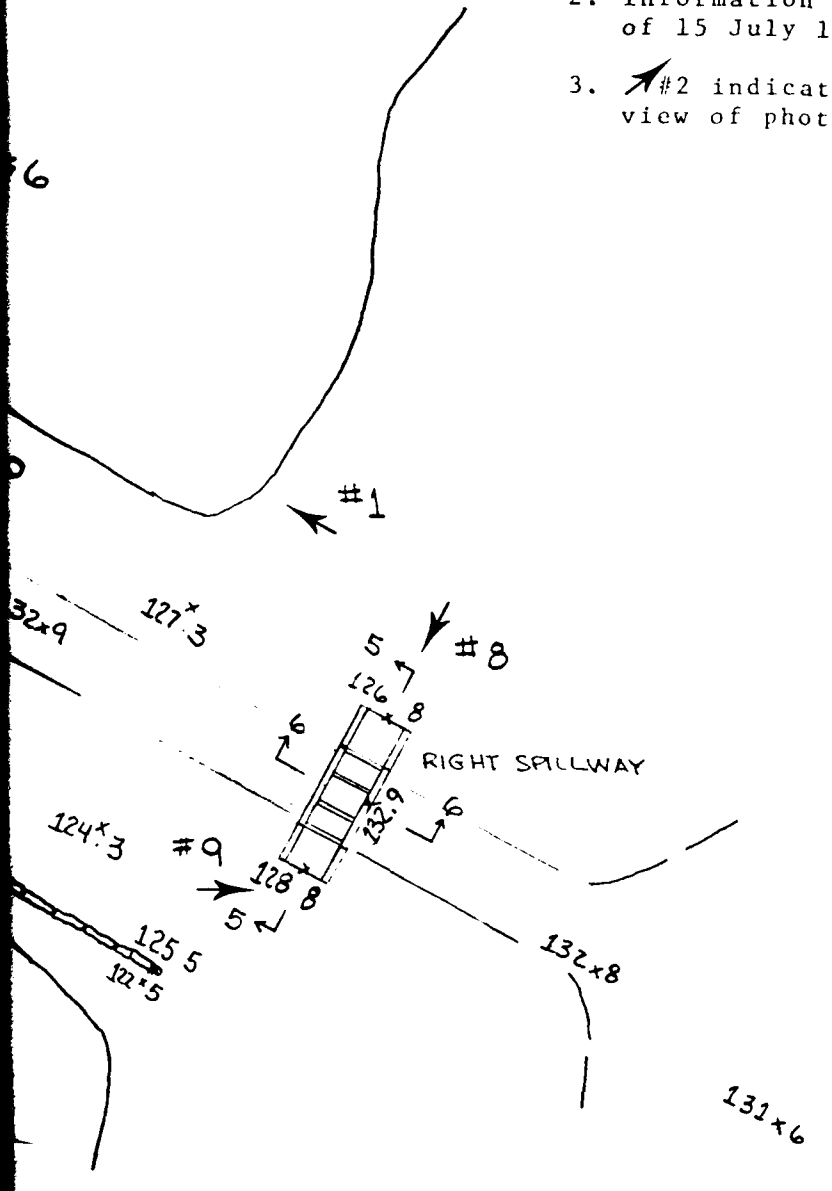
	Page
Figure B-1, Plan of Upper Bemis Pond Dam	B-1
Figure B-2, Sections through Dam	B-2
Figure B-3, Plan of Lower Bemis Pond Dam	B-3
Figure B-4, Sections Through Dam	B-4
Figure B-5 through B-8 Drawings of Upper Bemis Pond Dated February 1954	B-5
Figure B-9 through B-11 Drawings of Lower Bemis Pond Dated June 1957	B-9
Previous Inspection Reports of Upper and Lower Bemis Pond Dams:	
Dated 1977 by the Massachusetts Department of Public Works	B-12
Dated 1969 through 1926 by the Hampden County Board of Commissioners	B-23



METCALF & EDDY INC

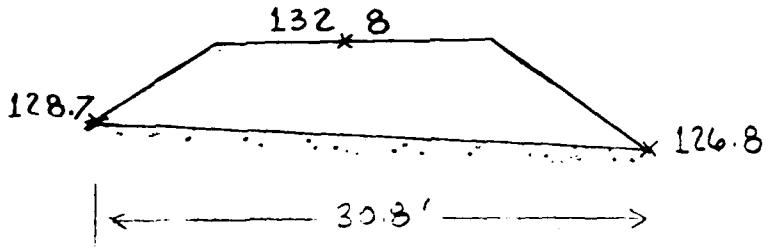
NOTES:

1. Elevations shown based on concrete crest of Lower Dam outlet structure, El. 132.9 (NGVD).
2. Information shown based on field inspection of 15 July 1980.
3. ↗#2 indicates location and direction of view of photographs.

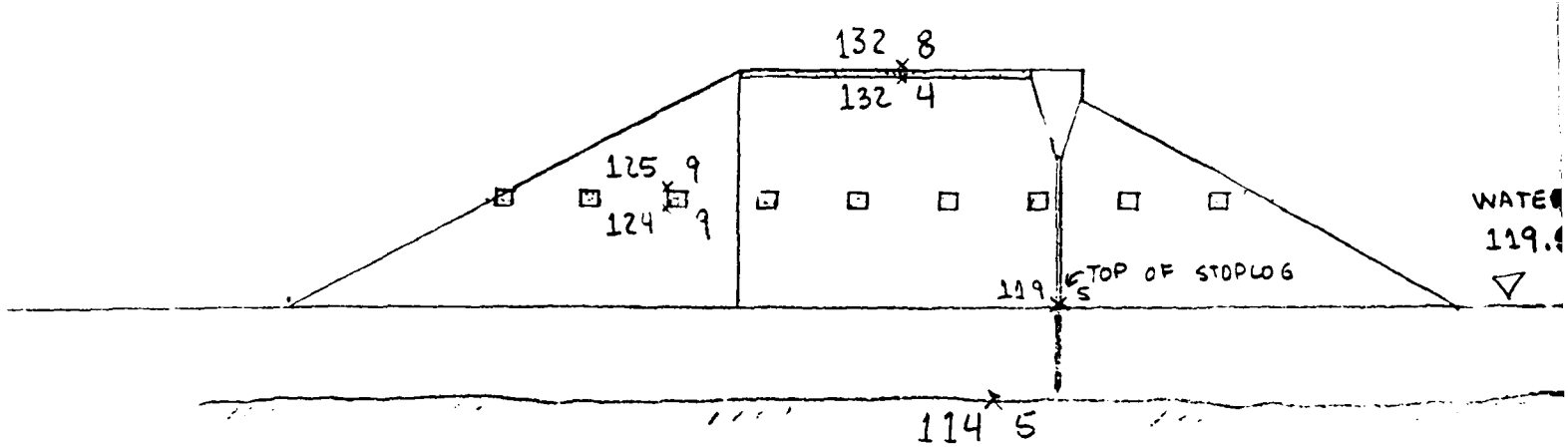


METCALF & EDDY, INC. ENGINEERS BOSTON, MA.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
UPPER BEMIS POND DAM	
FIGURE B-1 PLAN OF DAM AND SPILLWAYS	
TRIBUTARY ABBEY BROOK	MASSACHUSETTS
SCALE: AS SHOWN	DATE: SEPTEMBER, 1980

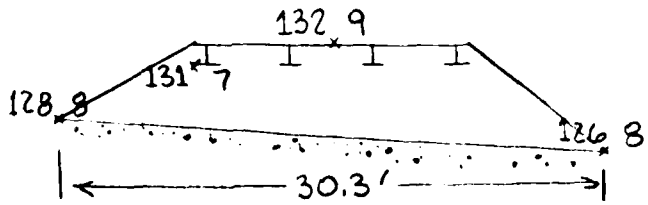
(2)



SECTION 1-1
LEFT SPILLWAY
SCALE 1 IN = 10 FT
(HORIZONTAL and VERTICAL)

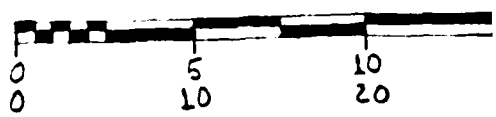


SECTION 3-3
FLUME
SCALE 1 IN = 10 FT
(HORIZONTAL and VERTICAL)

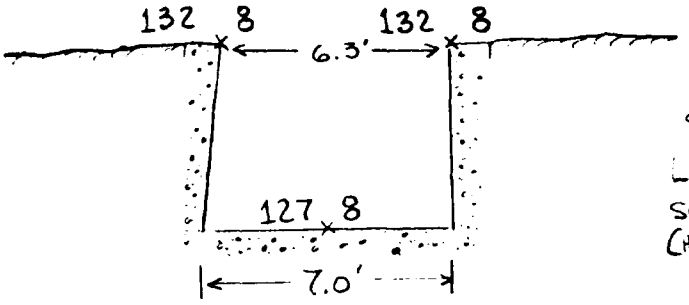


SECTION 5-5
RIGHT SPILLWAY
SCALE 1 IN = 10 FT
(HORIZONTAL and VERTICAL)

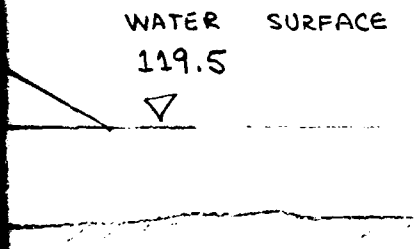
SECTION
SCALE
IN FEET

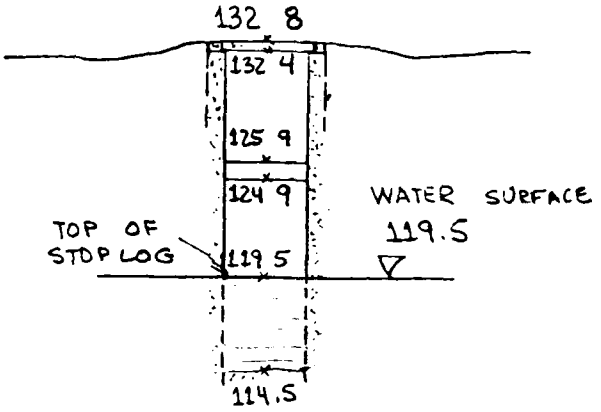


METCALF & EDDY, INC.

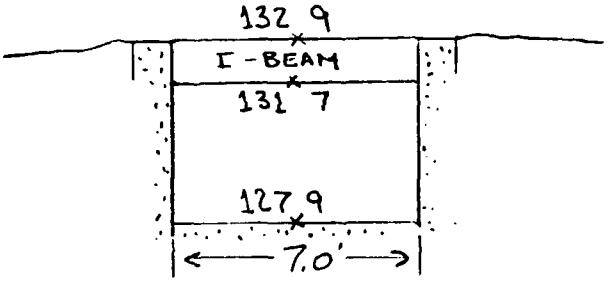


SECTION 2-2
LEFT SPILLWAY
SCALE 1 IN = 5 FT
(HORIZONTAL and VERTICAL)





SECTION 4-4
FLUME
SCALE 1 IN = 10 FT
(HORIZONTAL and VERTICAL)



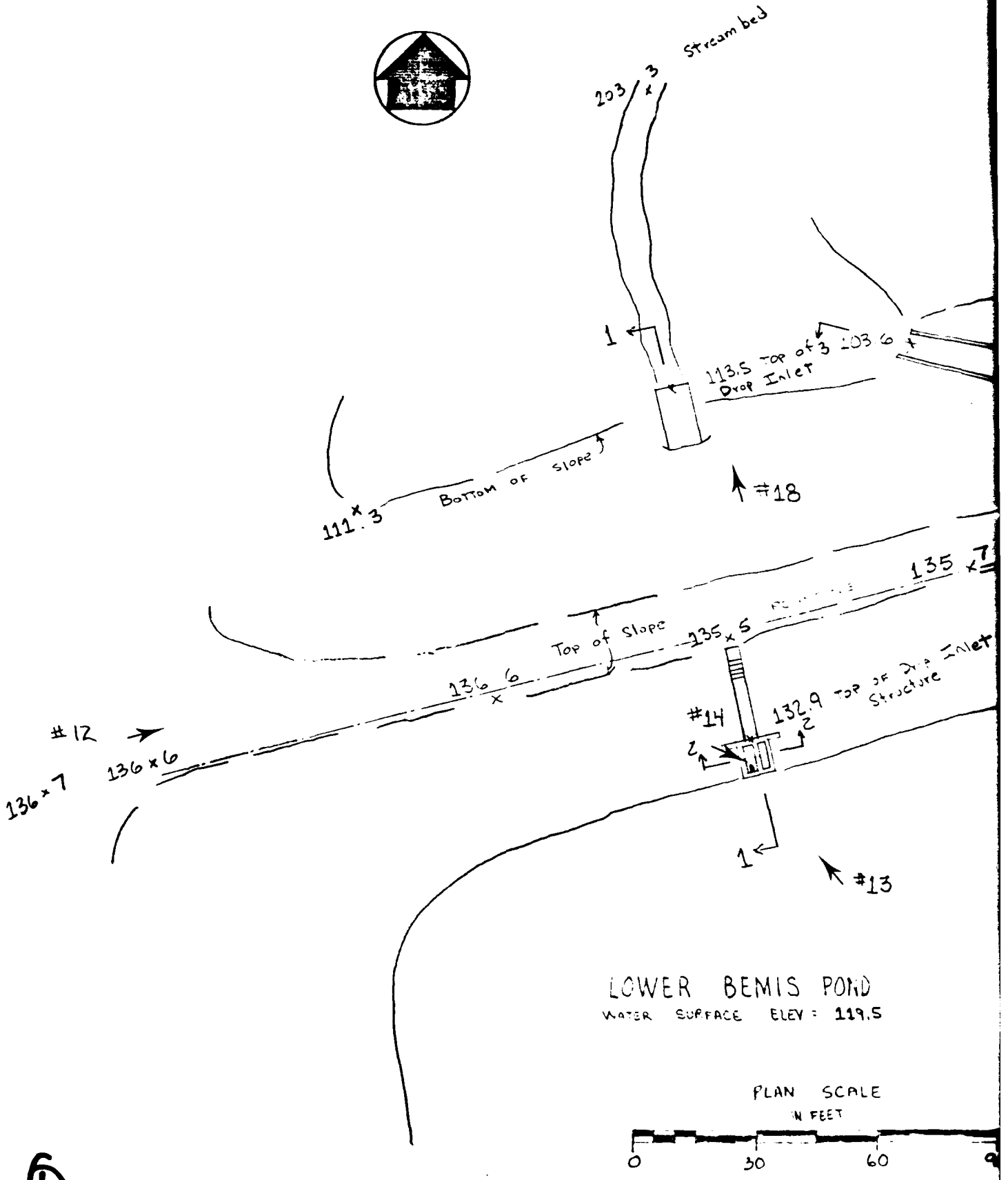
SECTION 6-6
RIGHT SPILLWAY
SCALE 1 IN = 5 FT
(HORIZONTAL and VERTICAL)

ION
LE
EET

10 15
20 30

METCALF & EDDY, INC. ENGINEERS BOSTON, MA.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
UPPER BEMIS POND DAM	
FIGURE B-2 SECTIONS THROUGH DAM AND SPILLWAYS	
TRIBUTARY ABBEY BROOK	MASSACHUSETTS
SCALE: AS SHOWN	DATE: SEPTEMBER, 1980

(2)



LOWER BEMIS POND

WATER SURFACE ELEV = 119.5

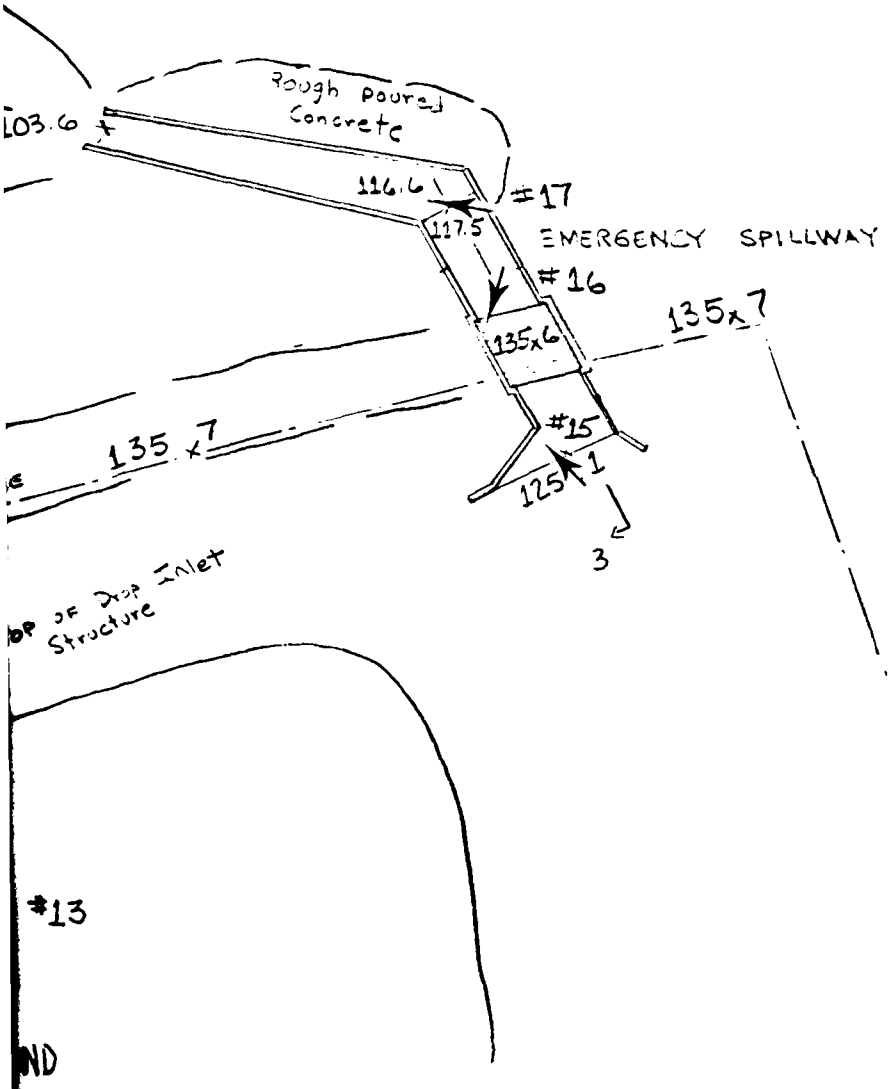
PLAN SCALE IN FEET

0 30 60

METCALF & EDDY, INC.

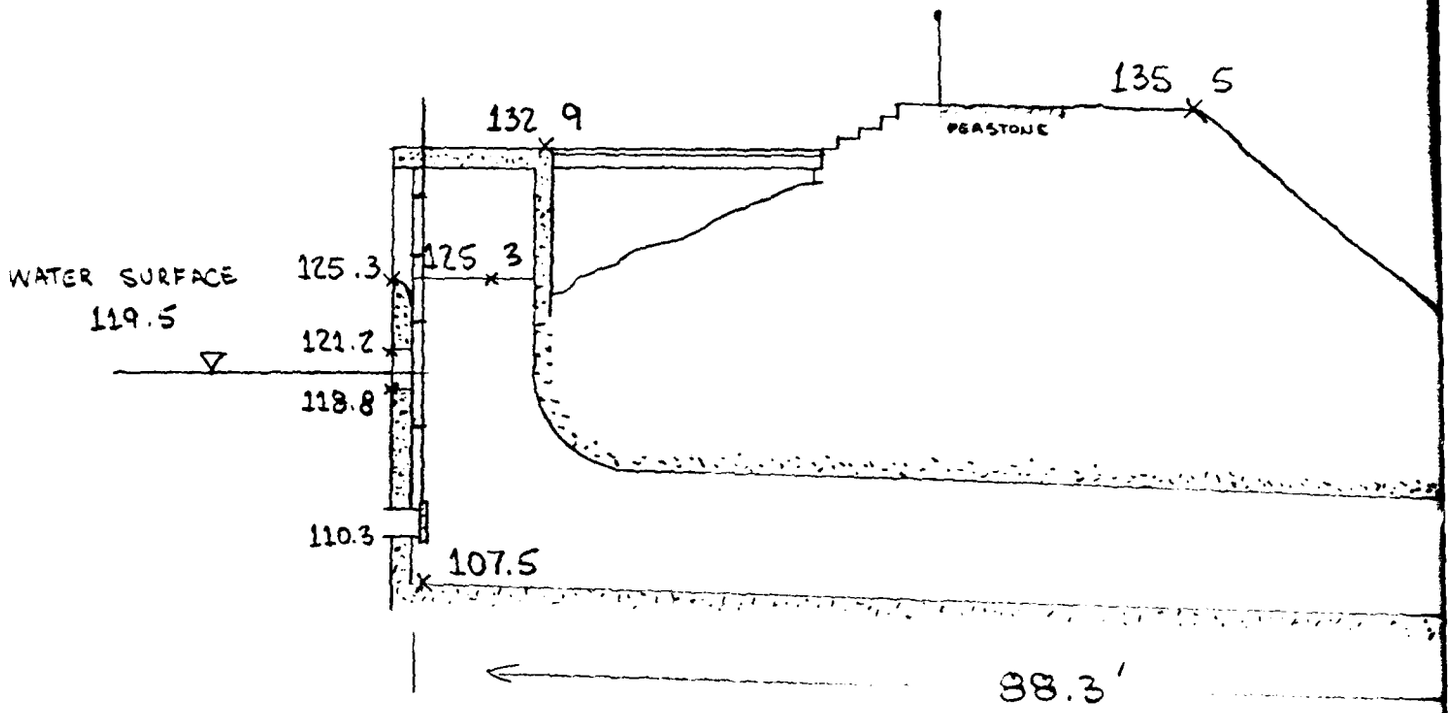
NOTES:

1. Elevations shown based on concrete crest of Lower Dam outlet structure, El. 132.9 (NGVD).
2. Information shown based on field inspection of 15 July 1980.
3. ↗ #2 indicates location and direction of view of photographs.

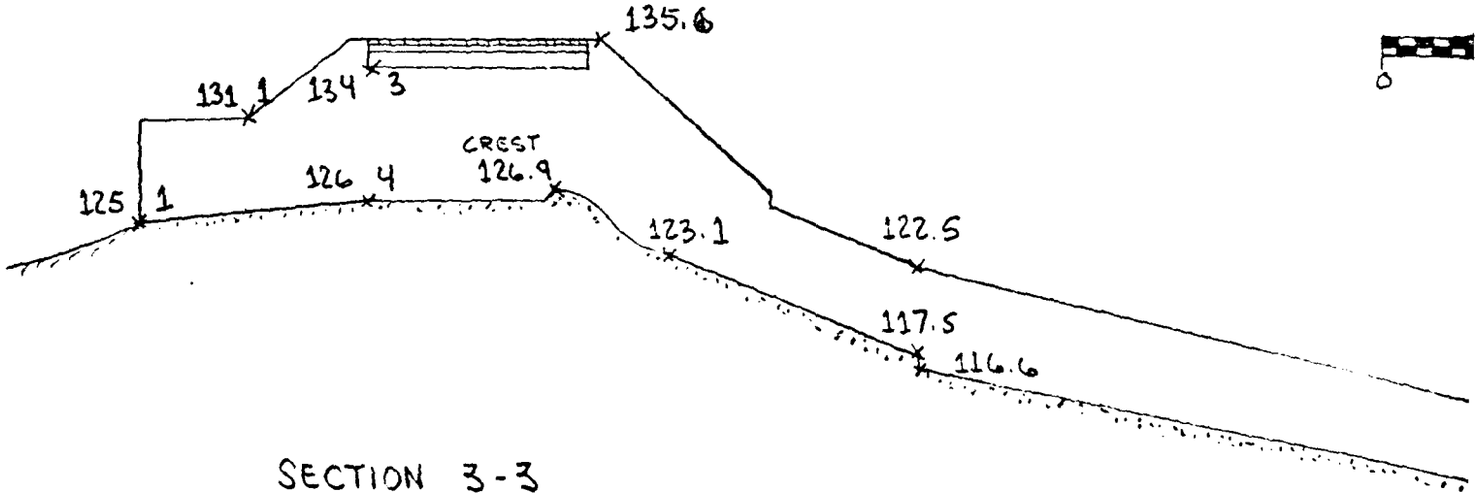


METCALF & EDDY, INC. ENGINEERS BOSTON, MA.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.
NATIONAL PROGRAM OF INSPECTION OF NON FED. DAMS	
LOWER BEMIS POND DAM	
FIGURE B-3 PLAN OF DAM AND SPILLWAY	
TRIBUTARY ABBEY BROOK	MASSACHUSETTS
SCALE: AS SHOWN	DATE: SEPTEMBER, 1980

(2)

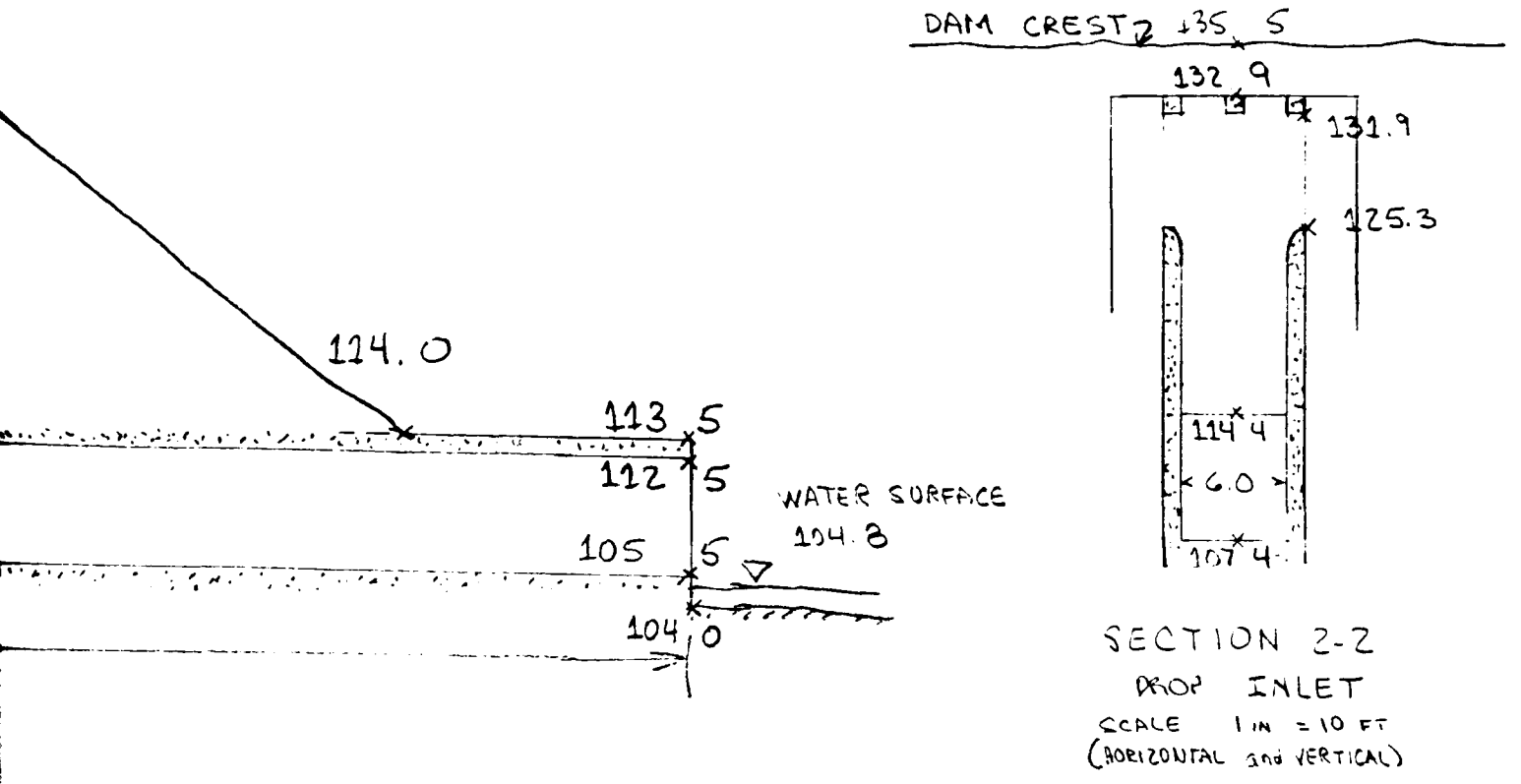


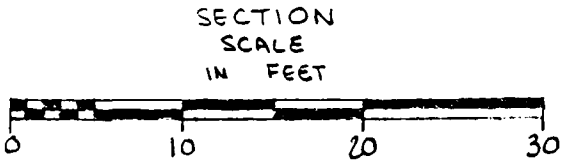
SECTION 1-1
DROP INLET
SCALE 1 IN = 10 FT
(HORIZONTAL and VERTICAL)

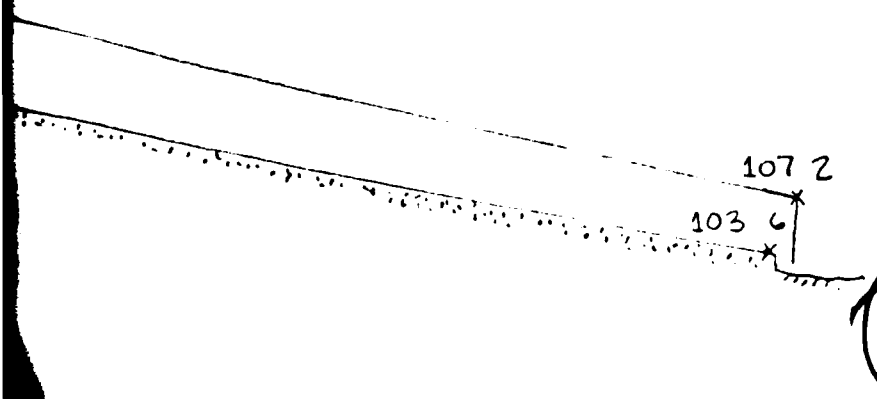


SECTION 3-3
SPILLWAY
SCALE 1 IN = 10 FT
(HORIZONTAL and VERTICAL)

METCALF & EDDY, INC.

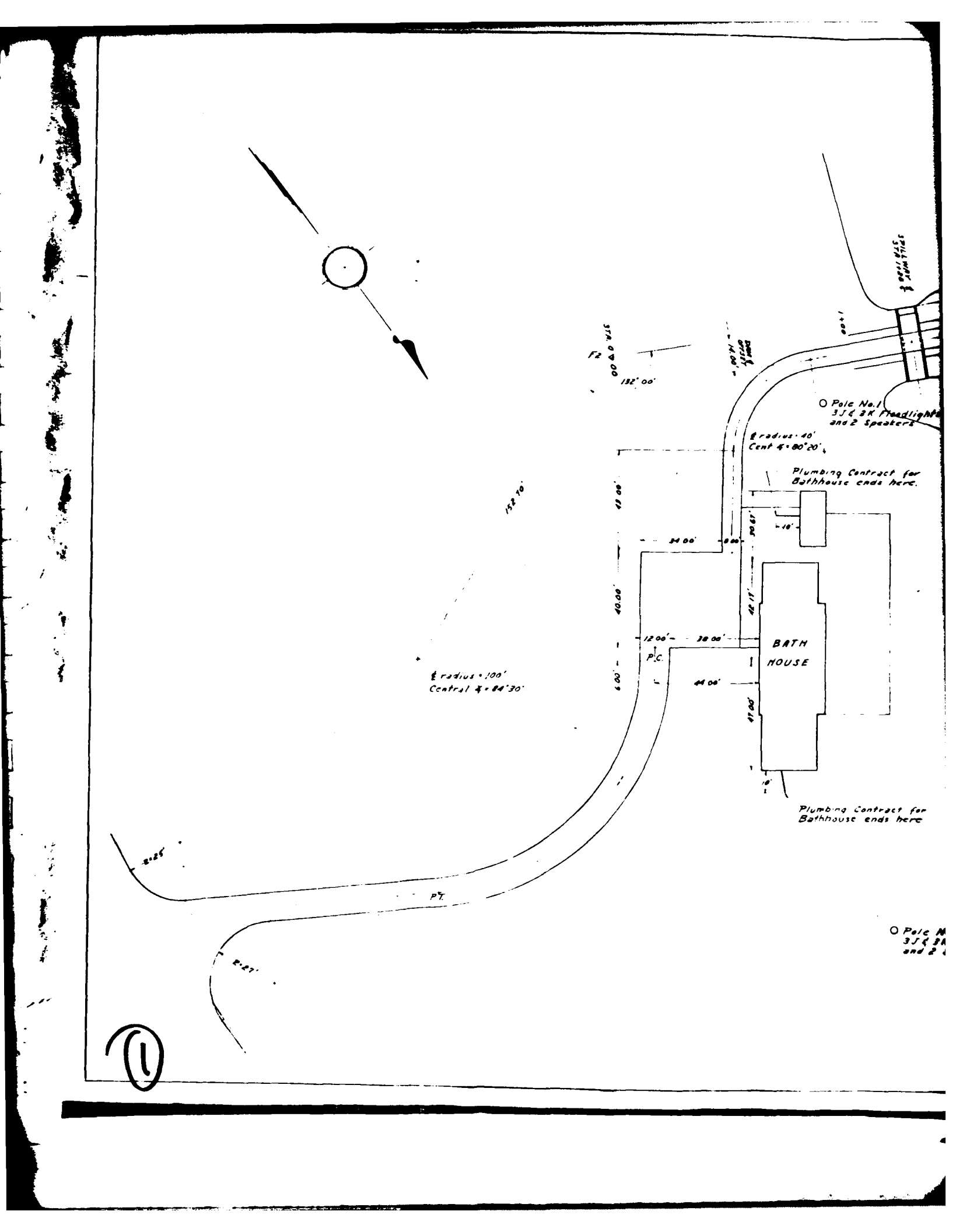


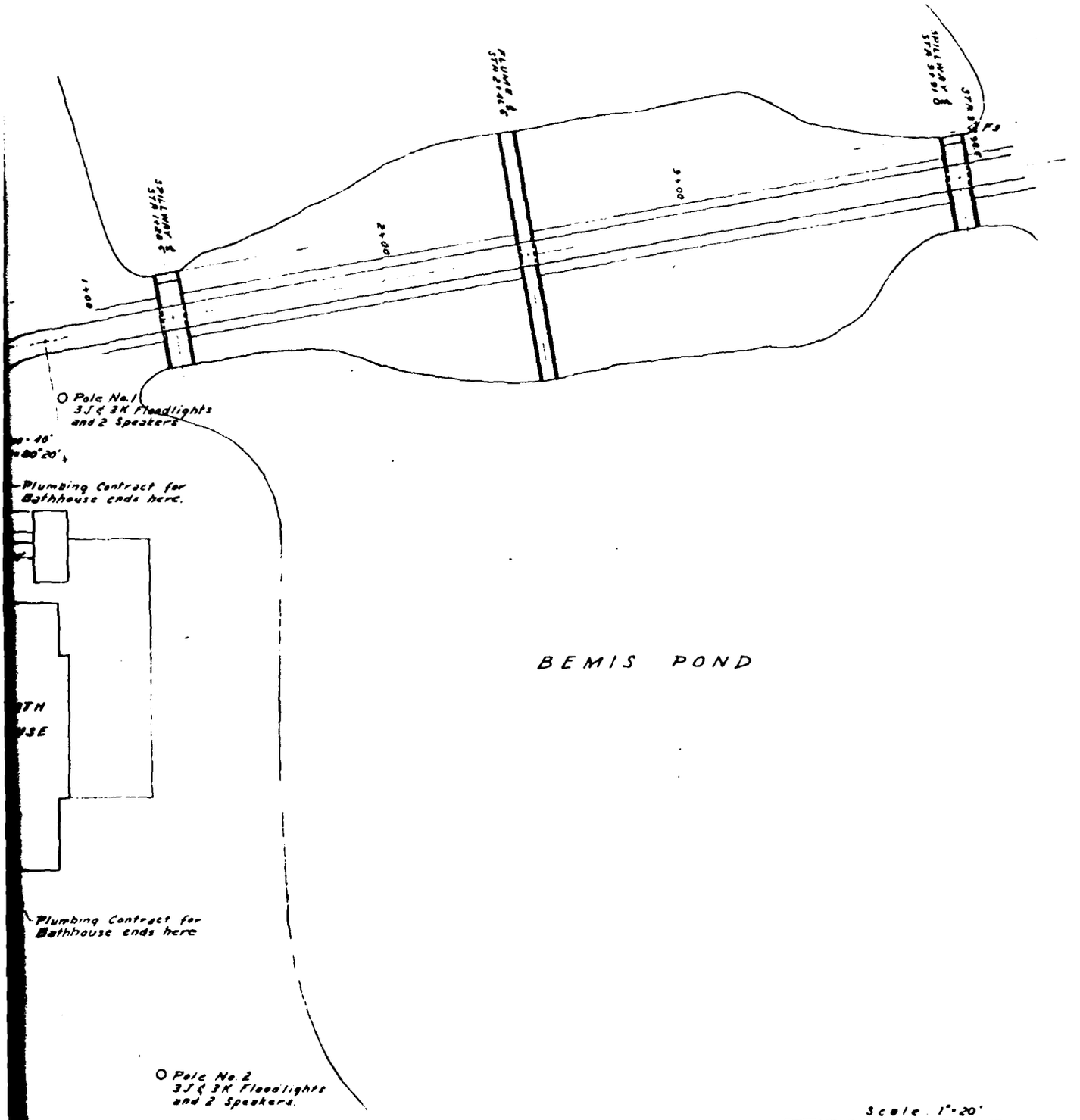




(2)

METCALF & EDDY, INC. ENGINEERS BOSTON, MA.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM MA
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
LOWER BEMIS POND DAM	
FIGURE B-4 SECTIONS THROUGH DAM AND SPILLWAY	
TRIBUTARY ABBEY BROOK	MASSACHUSETTS
SCALE: AS SHOWN	DATE: SEPTEMBER, 1980

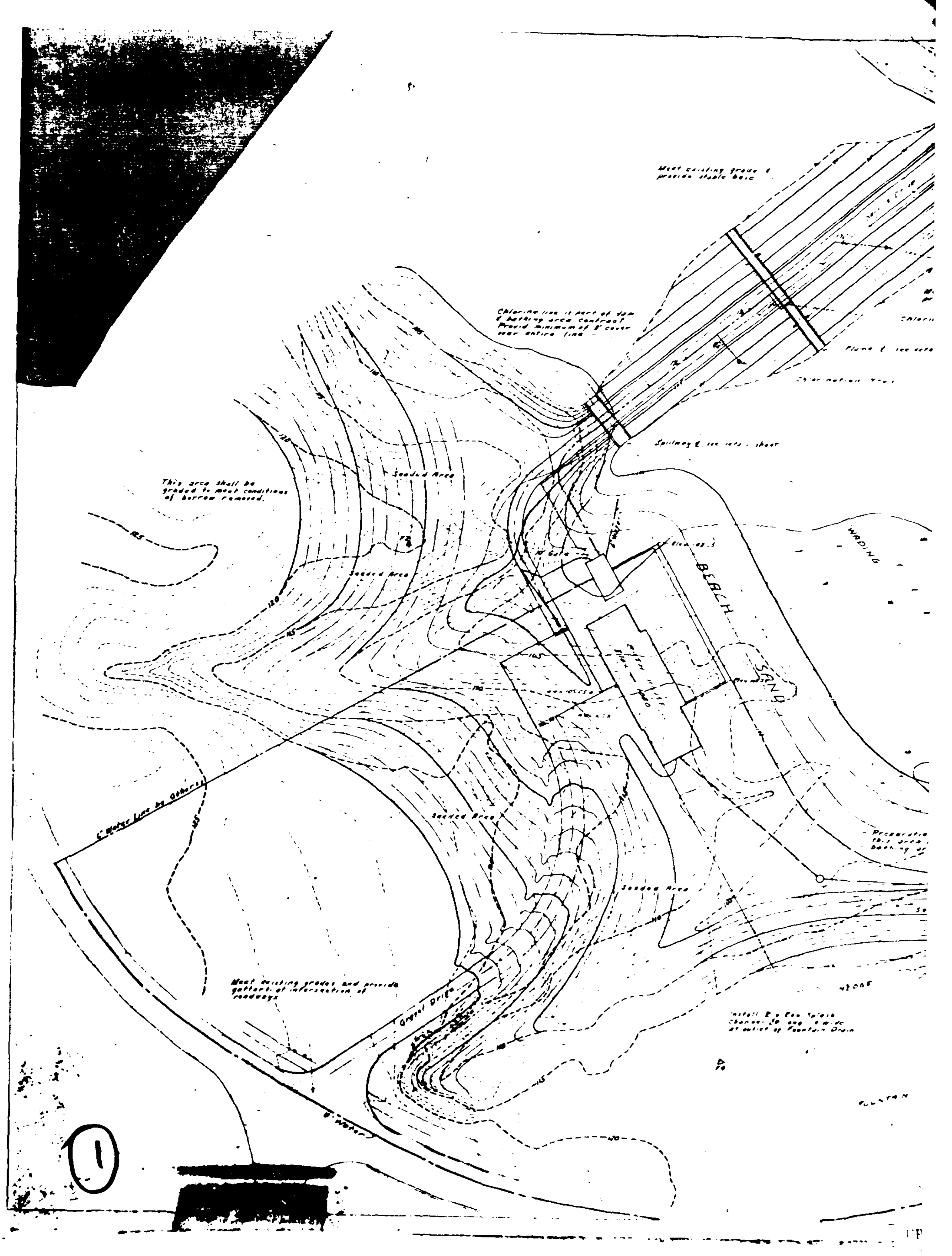

132' 00'
Pole No.1
3J & 3K Headlights
and 2 Speakers
℄ radius = 40'
Cent ∠ = 80°20'
Plumbing Contract for
Bathhouse ends here.
132.10
11.00
40.00
6.00
34.00
30.67
10'
42.11'
38.00'
12.00'
P.C.
BATH
HOUSE
44.00
11.00'
10'
℄ radius = 100'
Central ∠ = 84°30'
P.T.
Plumbing Contract for
Bathhouse ends here



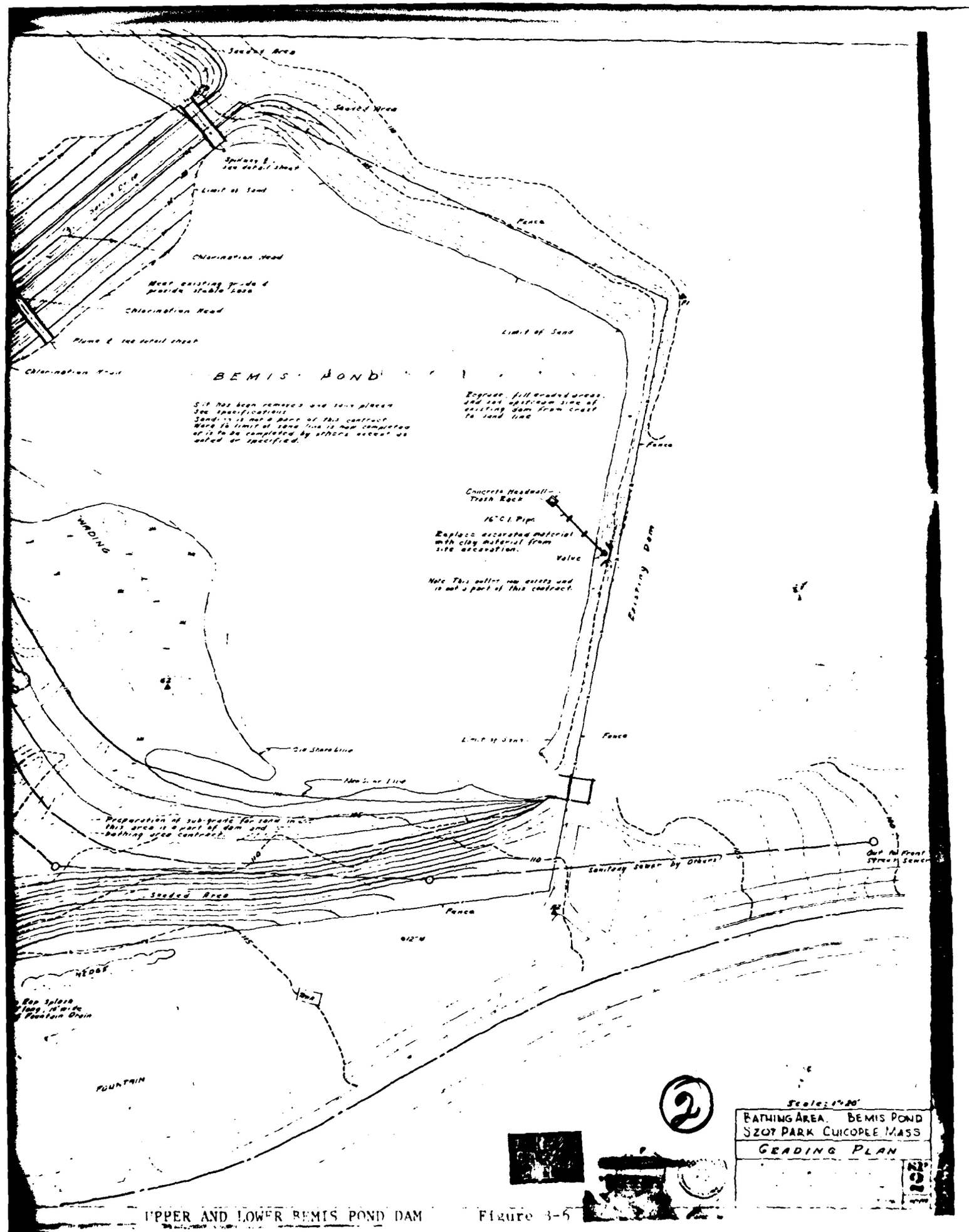
Scale 1"=20'

BATHING AREA, BEMIS POND
SZOT PARK, CHICOPEE MASS
SITE PLAN

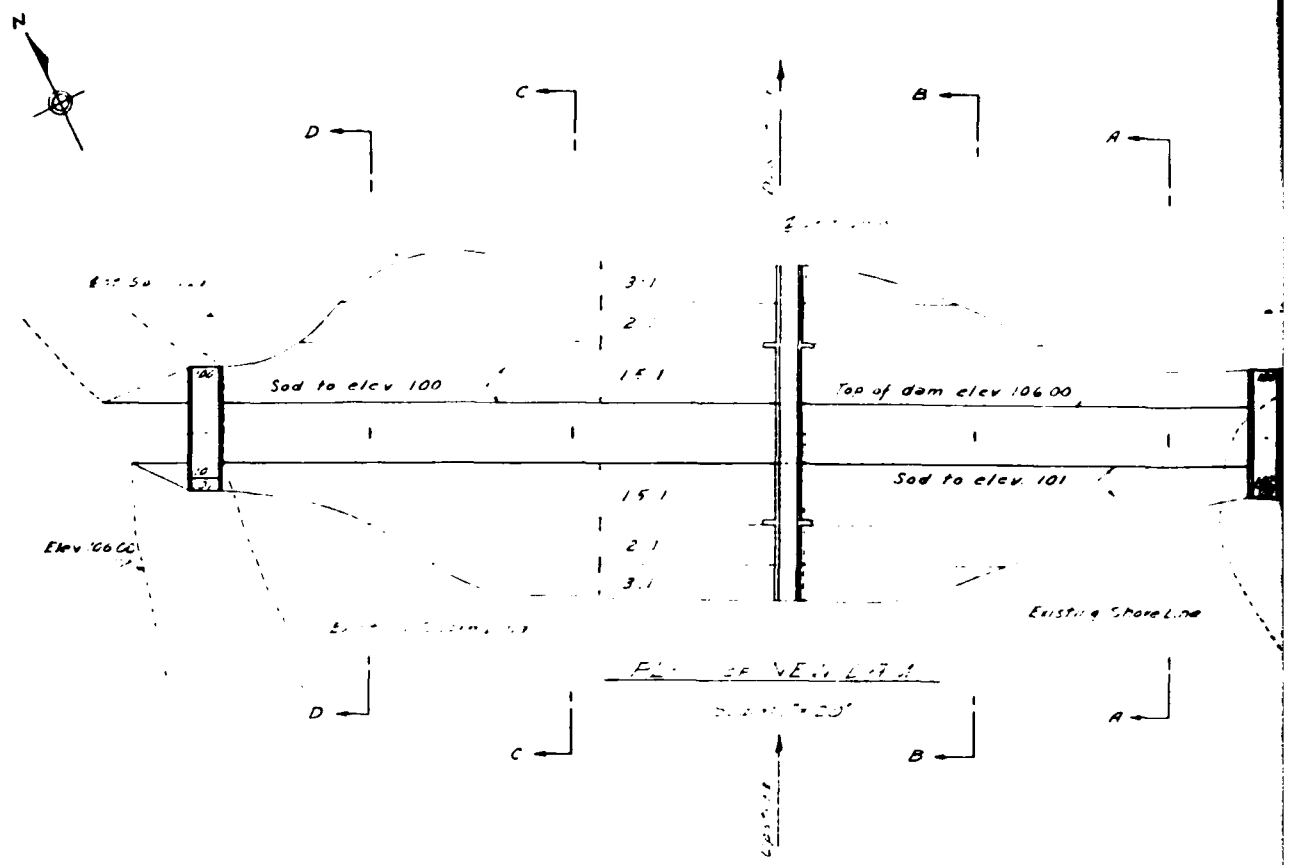
SP 1

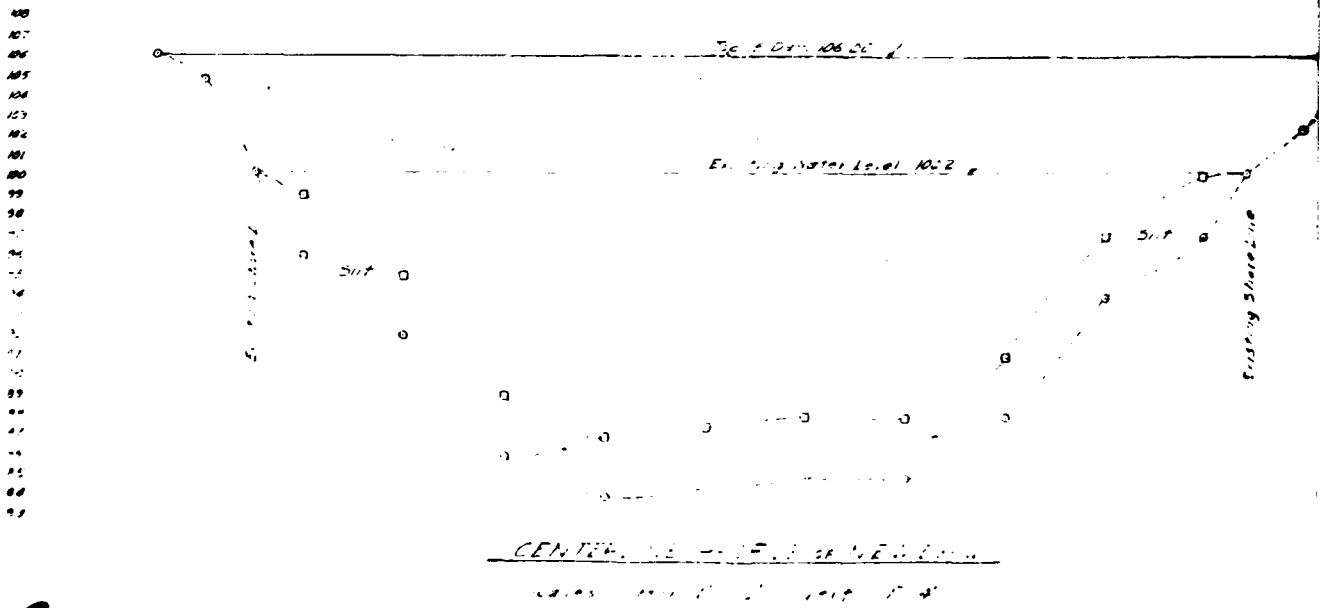


Meet existing grade & provide stable base
Chlorine line is part of dam & bathing area contract. Provid minimum of 3' cover over entire line
Spillway ℄ see sets sheet
This area shall be graded to meet conditions of borrow removed.
Seeded Area
Seeded Area
Seeded Area
Seeded Area
BEACH
SAND
WADING
Water line by Others
Meet existing grades and provide pattern of intersection of roadways
Gravel Drive
Install ℄ a Con Splash Channel at outlet of Fountain Drain
125
120
115
110
105
1

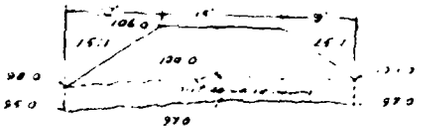


UPPER AND LOWER BEMIS POND DAM Figure 3-5

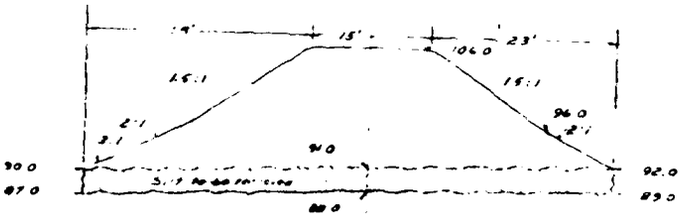

N
D
C
B
A
3:1
2:1
1:1
Sod to elev 100
Top of dam elev 106.00
Sod to elev. 101
Elev 106.00
Existing Shore Line


Top of Dam 106.00
Silt
Existing Shore Line

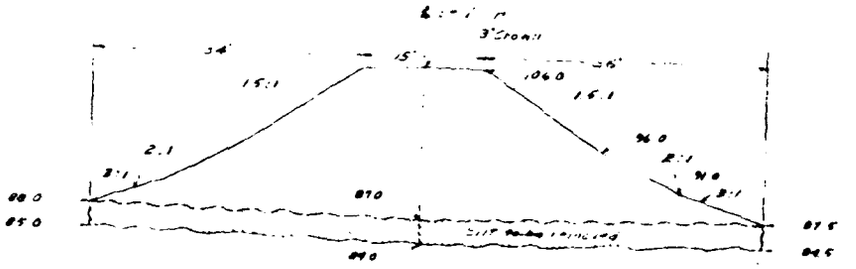
0



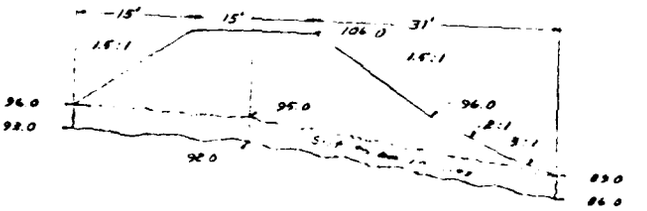
SECTION "A-A"



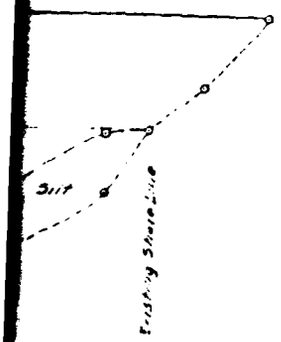
SECTION "B-B"

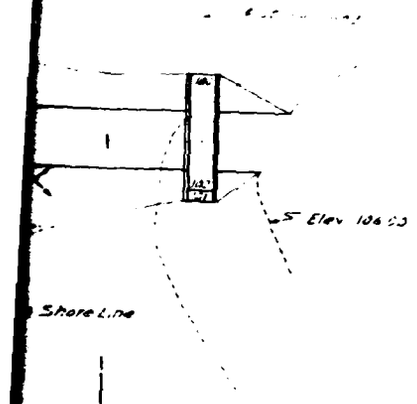


SECTION "C-C"



SECTION "D-D"





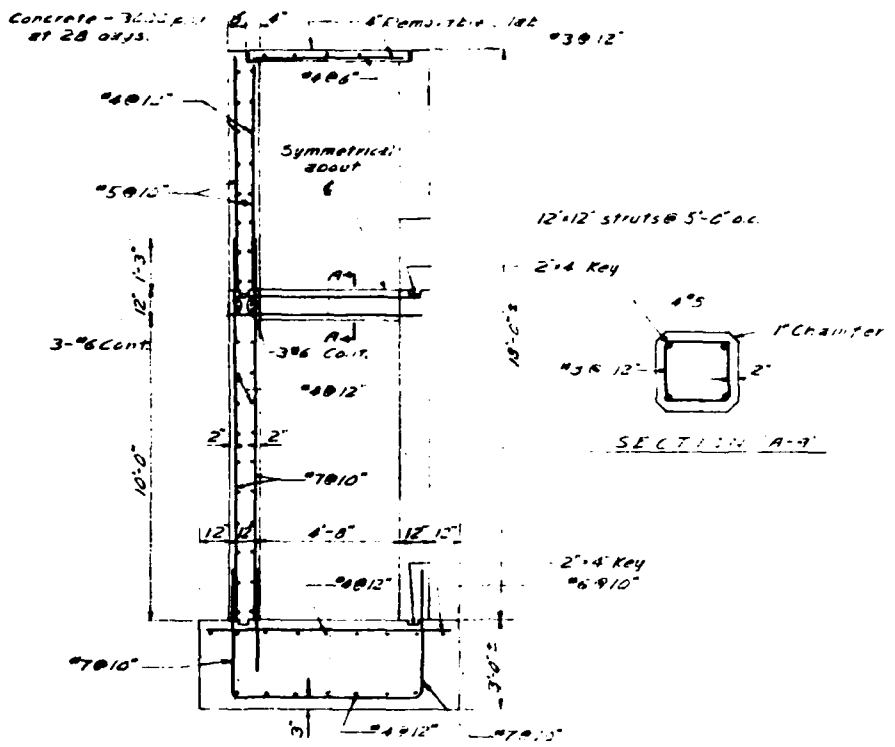
Scales as noted

BATHING AREA, BEMIS POND
SZOT PARK, CHICOPEE MASS.

DAM DETAILS

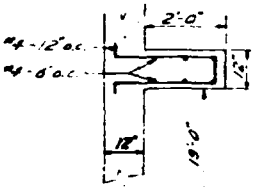
SP 3

2



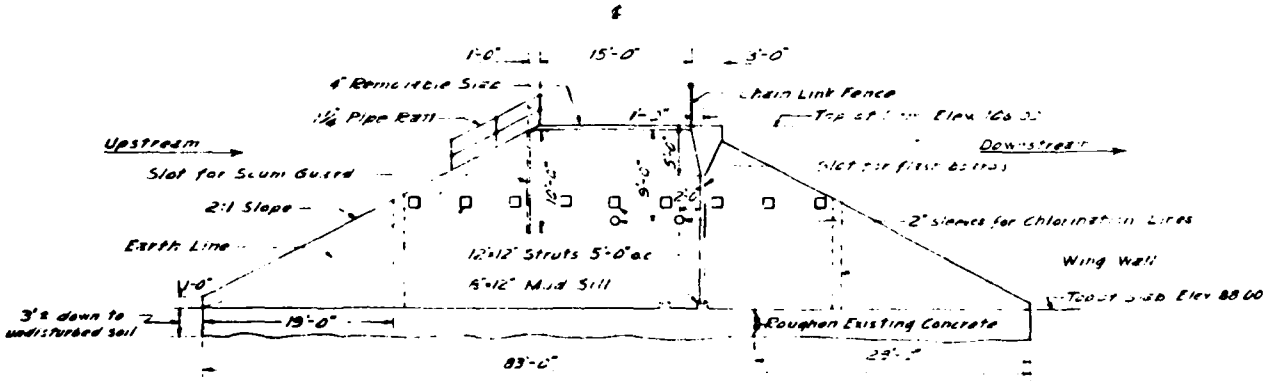
TRANSVERSE SECTION THROUGH FLUME

Scale: 3/8" = 1'-0"



WING WALL DETAIL

Scale: 1/2" = 1'-0"



LONGITUDINAL SECTION THROUGH FLUME

Scale: 1/8" = 1'-0"

Scale: 1/1"-0"

Water tight Joints

2 / 20 oz Copper

End Cap 24 oz Copper

20 oz. Copper

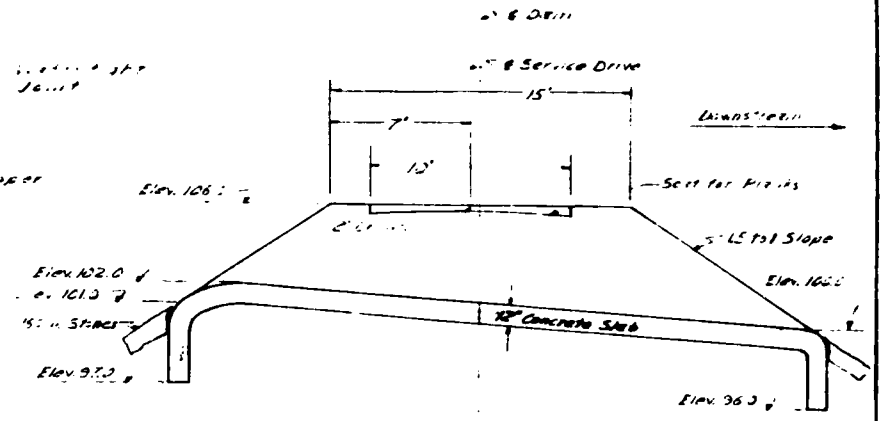
4-1½" out to out

2"

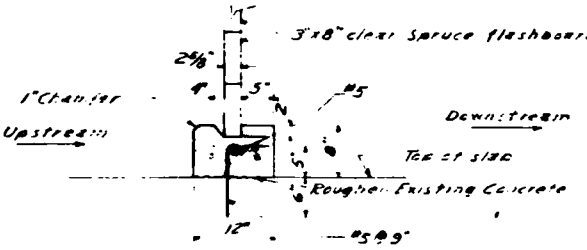
ND SECTION
Scale: 3"=1'-0"

TYPICAL SECTION
Scale: 3"=1'-0"

SCUM GUARD DETAILS

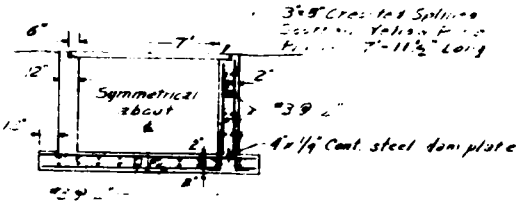


LONGITUDINAL SECTION THROUGH SPILLWAYS
Scale: 1/8"=1'-0"



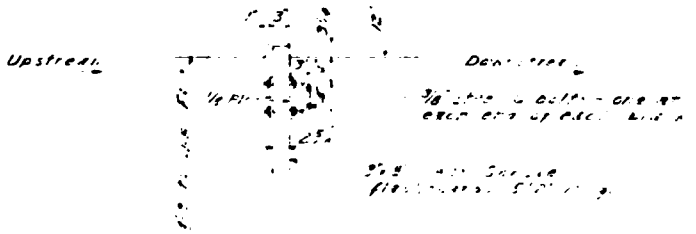
TAIL

MUD SILL DETAIL
Scale: 1"=1'-0"



TRANSVERSE SECTION THROUGH SPILLWAY
Scale: 1/8"=1'-0"

Elev. 88.00



FLASHBOARD DETAIL

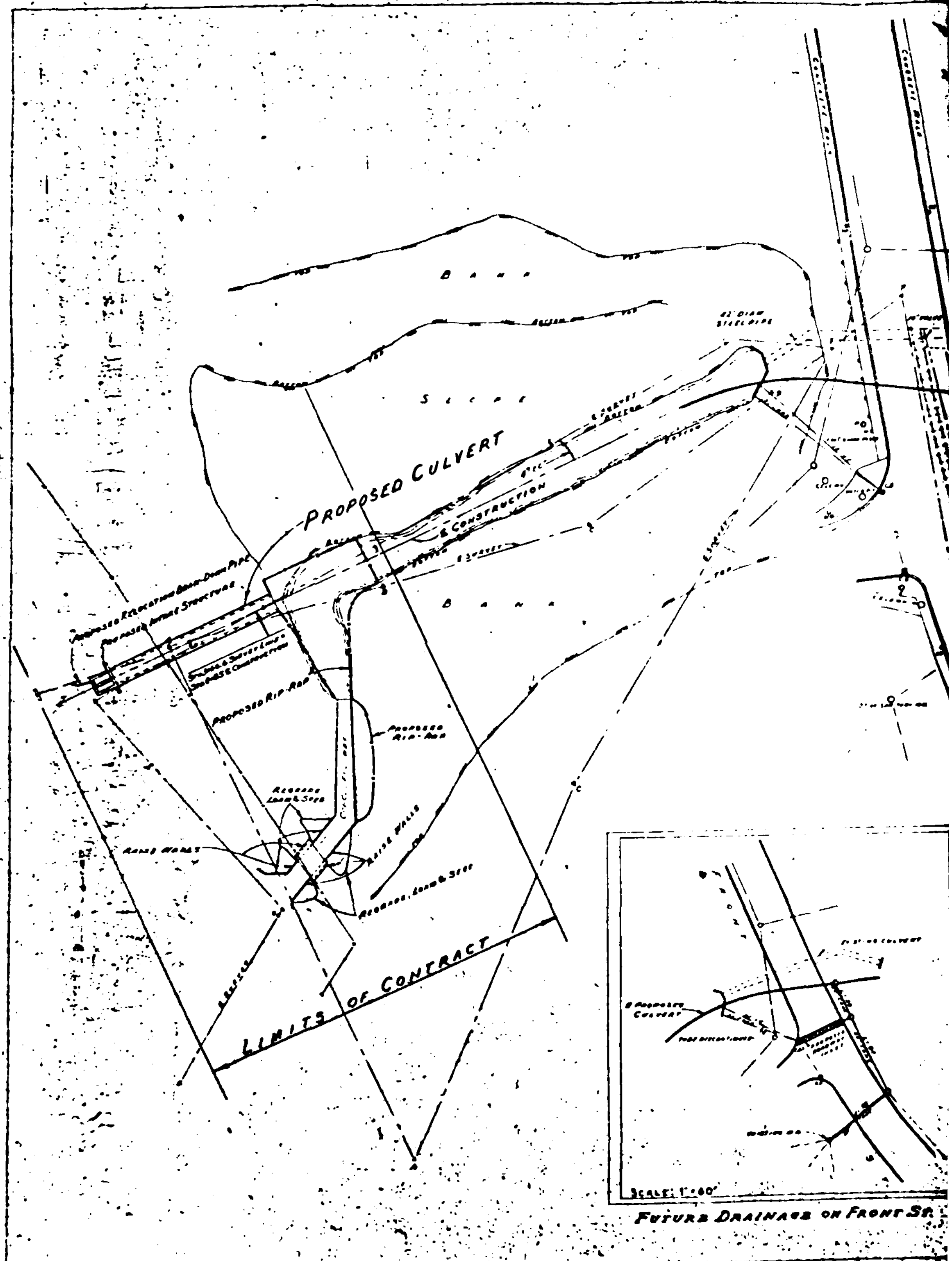
Scales as noted

BATHING AREA, BEMIS POND
SZOT PARK, CHICOPEE MASS.

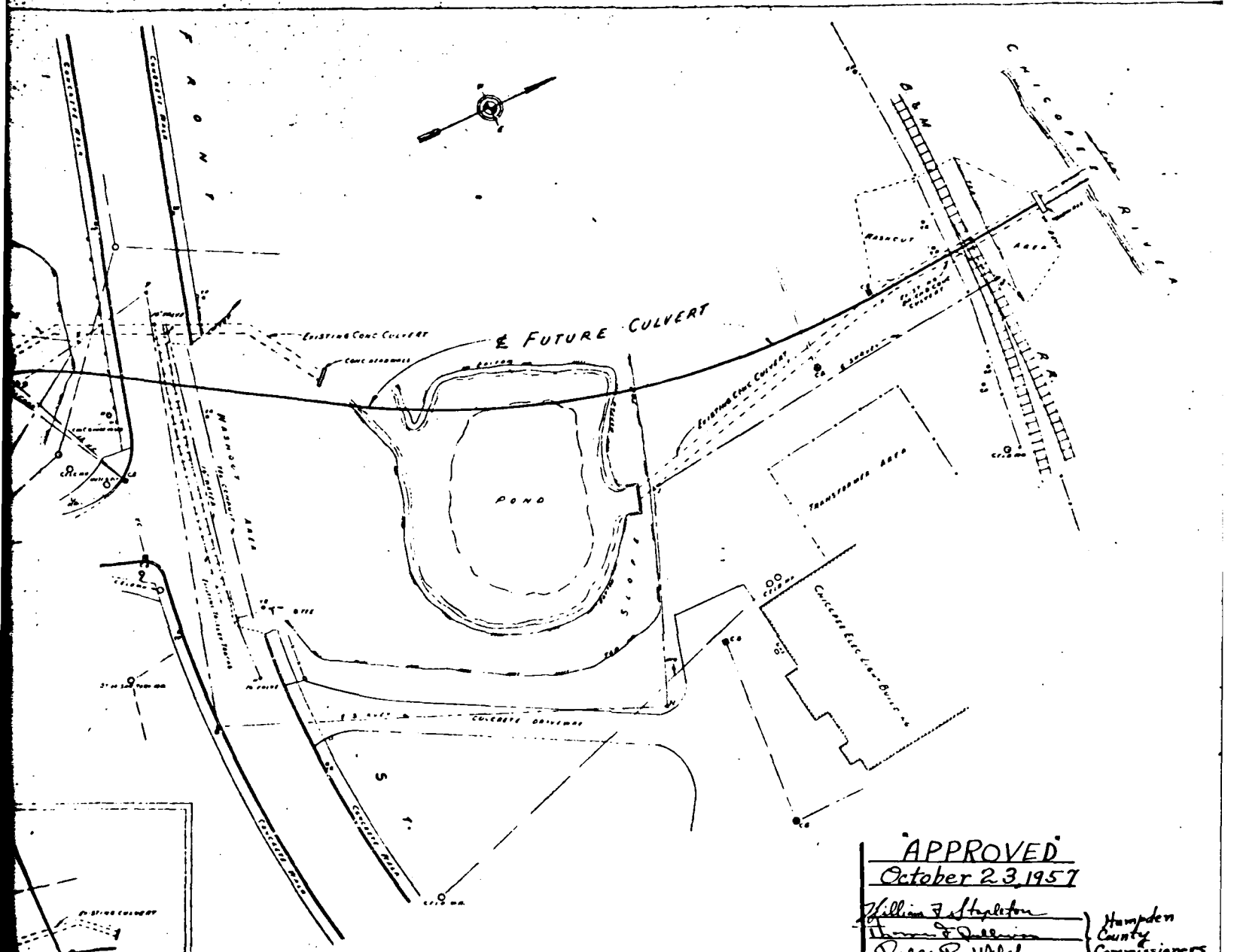
FLUME & SPILLWAY DETAILS

SP 4

UPPER BEMIS POND DAM Figure B-8


PROPOSED CULVERT
LIMITS OF CONTRACT
PROPOSED RIP-RAP
BANK
SLOPE
FUTURE DRAINAGE ON FRONT ST.

1



APPROVED
October 23, 1957
William F. Stapleton
[illegible]
Ralph P. Walsh
Hampden County Commissioners

Commonwealth of Massachusetts
Hampden, ss
Filed – August 2 1957
Attest: Edward G. Shea
Clerk.

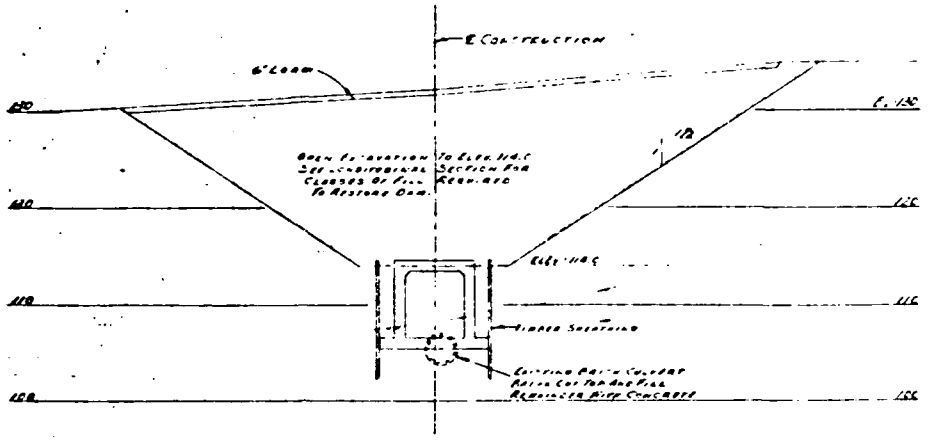
THIS PLAN HAS BEEN REDUCED

LOCATION PLAN
- BEMIS POND DAM REPAIR
CITY OF CHICOPEE, MASS.
TIBBETTS & BOND, CONSULTING ENGINEERS HOLYOKE, MASS.
SCALE: 1"=30' JUNE, 1957

1

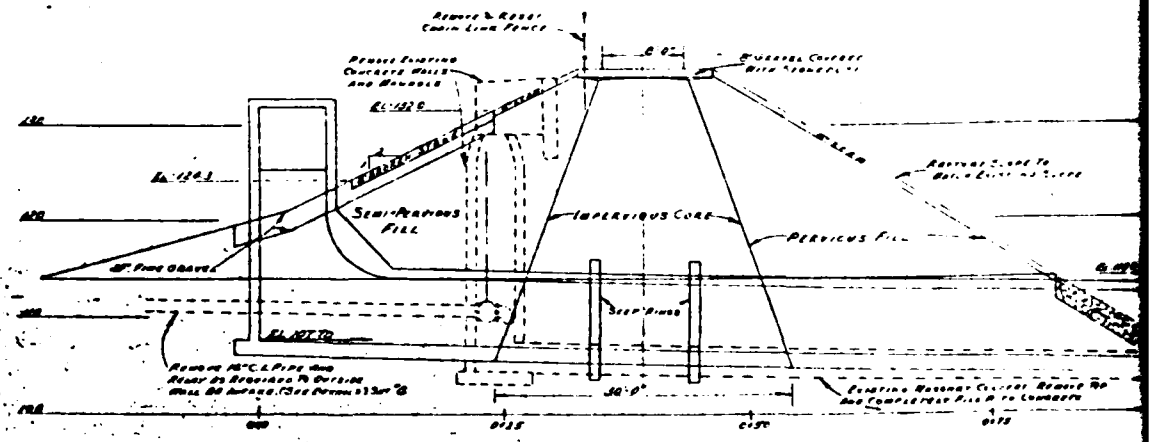
LOWER BEMIS POND DAM

Figure B-9



SECTION STATION 0+50

SCALE: 1" = 8'



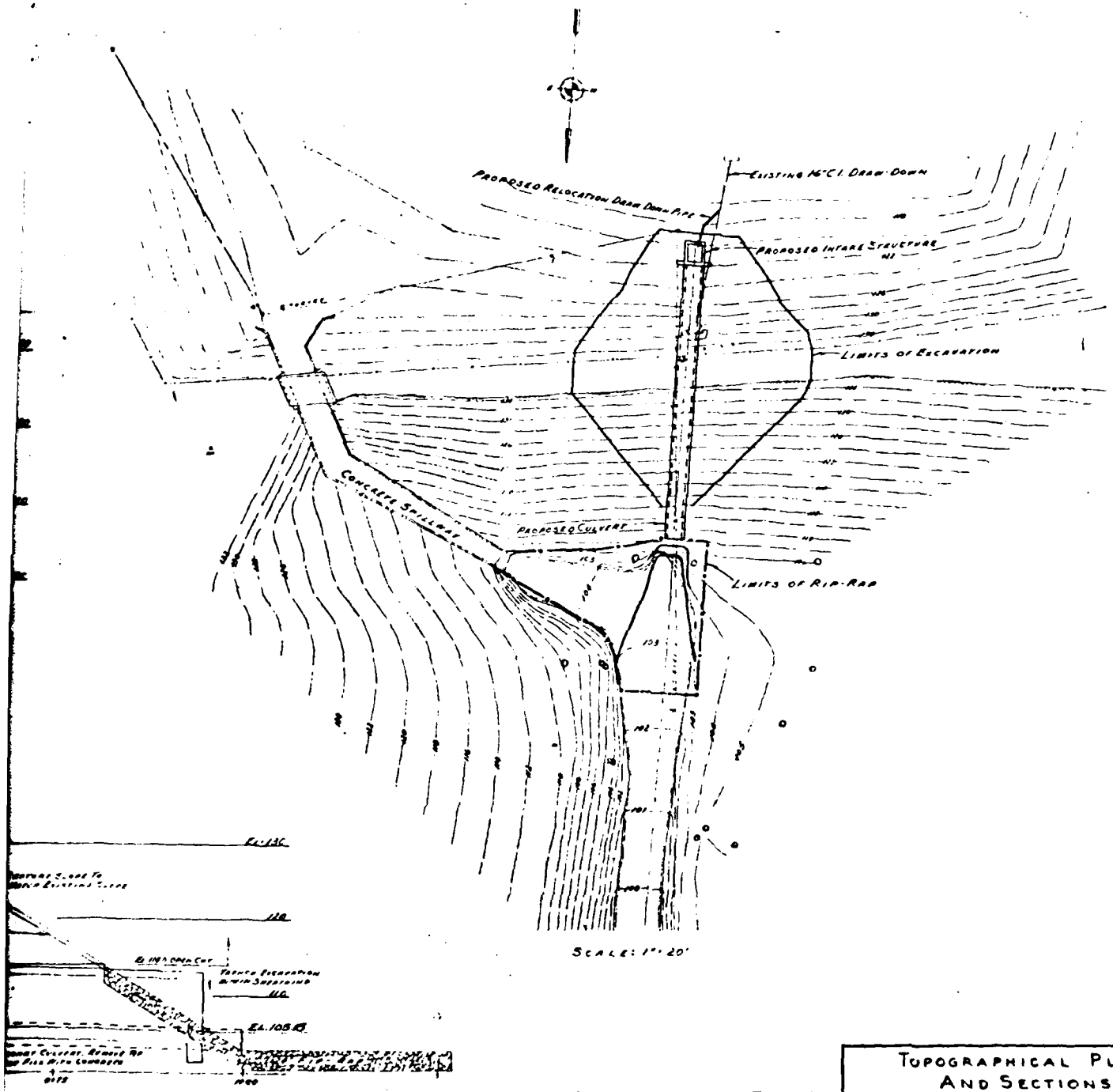
LONGITUDINAL SECTION
THRU
DAM INTAKE AND CULVERT

SCALE: 1" = 8'

CULVERT 6'-0" x 7'-0" AREA = 42 Sq. Ft.
SLOPE = 26.3'/1000 Q = 1000 cfs VEL = 23.8 f/sec.

THIS
BEAM

(1)



THIS PLAN HAS BEEN REDUCED

DRAWN BY		CHECKED BY	
TRACED BY		APPROVED BY	
NO.	DATE	REVISIONS	BY

TOPOGRAPHICAL PLAN AND SECTIONS

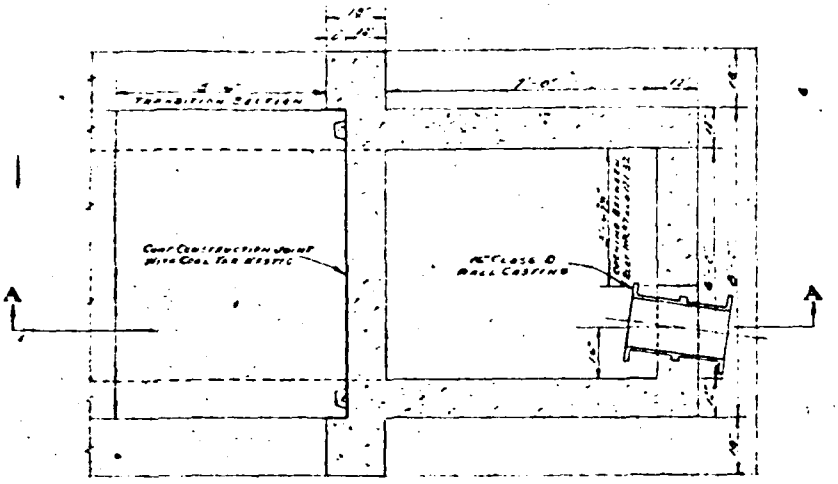
BEMIS POND DAM REPAIR

CITY OF CHICOPEE, MASS.

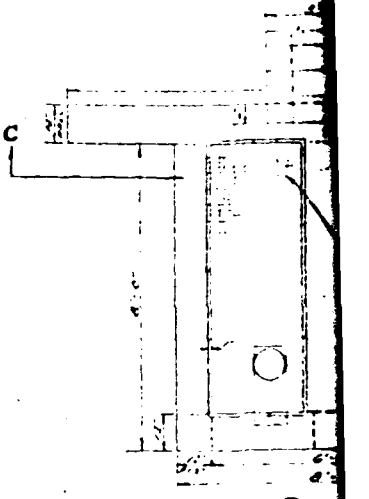
TIGHE & BOND, CONSULTING ENGINEERS
HOLYOKE, MASS.

SCALE: AS SHOWN DATE: June, 1977

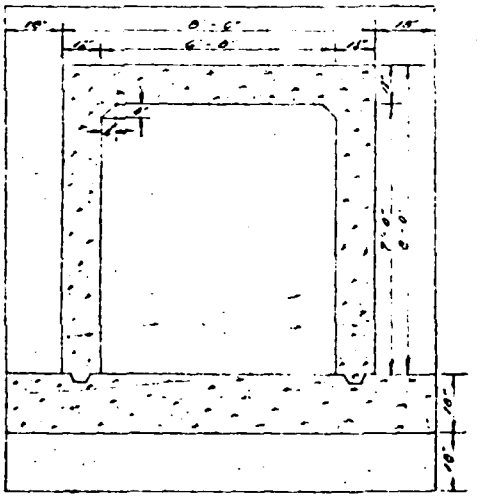
(2)



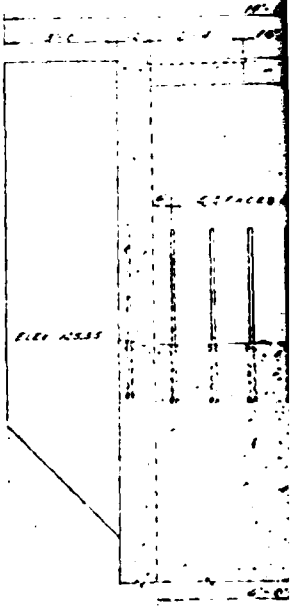
SECTION 2-2



TOP OF INTAKE

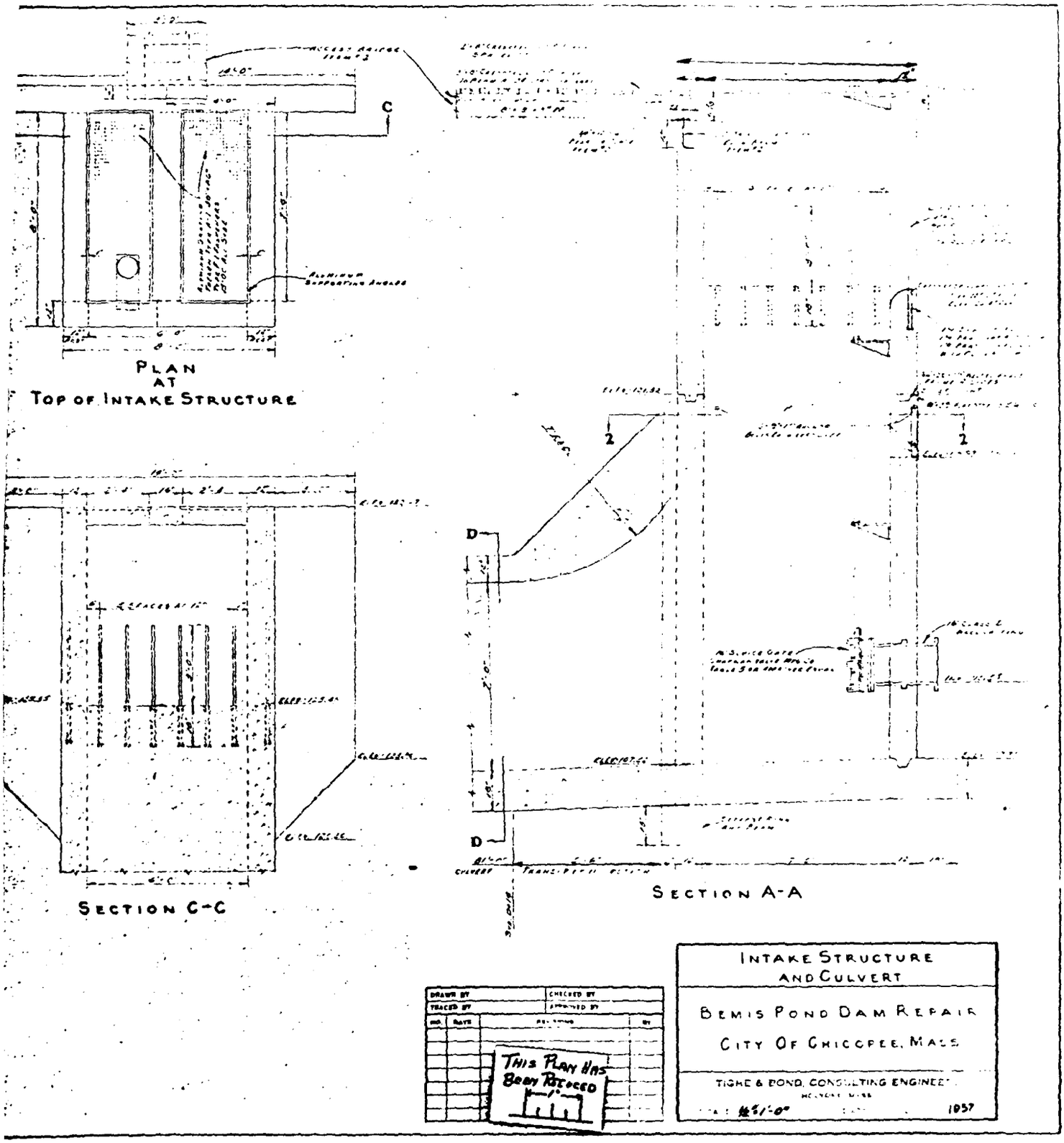


SECTION D-D
TYPICAL CULVERT SECTION
SHOWING SEEP RING STA. 0+14 TO 0+95



SECTION

(1)



LOWER BEMIS POND DAM Figure B-11

(2)

February 5, 1926

Robert and Edward Bemis,
760 Front St.,
Chicopee, Mass.

Dear Sirs:

In accordance with the provisions of Section 45 of Chapter 253 of the General Laws as amended by Chapter 334 of the Acts of 1923 and as further amended by Chapter 178 of the Acts of 1924 relative to the inspection, condition and safety of the dams of Hampden County, you are notified that your ice pond dam, located on Dingle Brook so-called in the City of Chicopee has been inspected by our engineer and your attention is called to the following recommendations made by him:

"There is some seepage along the toe of the dam especially towards its west end.
After several attempts failed to stop this seepage by dumping gravel on the upstream face of the structure, the owner concluded that the seepage was not from the pond, but a spring from the high natural bank against which the west end of the dam abuts.
In view of the large pondage behind the dam and the damage that might result from failure of the structure, it is recommended that, after the ice is harvested, that this seepage be more thoroughly investigated and traced to its source, as then the pond can be drawn down in all probability without much, if any, inconvenience to the owner."

Now, therefore, in accordance with Section 46 of said Chapter 253, it is ordered that the above recommendations be complied with in a reasonable time.

Yours very truly,

COUNTY COMMISSIONERS

_____
Chairman

_____

_____

December 30, 1020

Robert and Edward Bemis;
760 Front Street,
Chicopee, Mass.

Gentlemen:

In accordance with the provisions of Section 45 of Chapter 253 of the General Laws as amended by Chapter 334 of the Acts of 1923 and as further amended by Chapter 178 of the Acts of 1924 relative to the inspection, condition and safety of the dams of Hampden County, you are notified that your ice pond dam, located on Dingle brook, so called, in the city of Chicopee has been inspected by our engineer and your attention is called to the following recommendation made by him:

> "The seepage through the ice pond earthen dam across Dingle brook in Chicopee, about which the owners were notified some time ago, has not been stopped and appears to be increasing.
> It is recommended, therefore, in view of the large pondage formed by the dam and the damage which might result from its failure, that the pond be drawn down until the structure is repaired."

Now, therefore, in accordance with Section 46 of said Chapter 253, it is ordered that the above recommendation be complied with in a reasonable time.

Yours very truly,

COUNTY COMMISSIONERS

_____
Chairman

_____

_____

This form written by Mr. Tighe

MEMBER
AM SOC C E.
INST C E GREAT BRITAIN
ENG INST OF CANADA

JAMES L. TIGHE

CONSULTING ENGINEER
CALEDONIAN BUILDING, 189 HIGH STREET
HOLYOKE, MASS.
TELEPHONE 790
MEMBER AM. INST. OF CONSULTING ENGINEERS, INC.

MEMBER
BOSTON SOC. C. E.
ENG SOC WEST. MASS.
AM. & N. E. W. W. ASSOC'S

WATER SUPPLY
SEWERAGE
SEWAGE DISPOSAL
ANALYSIS OF WATER

WATER POWER INVESTIGATIONS
AND DEVELOPMENT
DAMS AND POWER INSTALLATIONS
ESTIMATES AND APPRAISALS

April 12, 1933.

The Hon. The Board of County Commissioners,
Hampden County,
Springfield, Massachusetts,

Gentlemen:

A recent inspection of the Ferris ice pond earthen dam, on Dingle Brook in the City of Chicopee, shows that it is not in a safe condition.

The overflow which is a brick well connected with a 28 X 30 inch brick culvert laid through the dam, is obstructed, and the downstream slope of the embankment for a distance of about forty feet towards its east end has slipped somewhat.

Considering the large size of the pond and the damage which might result from failure of the dam, it is recommended that the water level in the pond be drawn down to at least the level of the roadway on Front Street, which is located only a short distance downstream, that is, to a level of not less than seventeen (17) feet below the top of the dam.

When the pond has been drawn down, it should not be re-filled until provision has been made for adequate and reliable overflow discharging capacity and the dam overhauled and strengthened generally.

Respectfully,

James L. Tighe

[illegible] Atlantic Ave
Westerly, R.I.
April 22-1933.

County Commissioners,
Springfield, Mass.

Attention Mr. Bray;

The notice from the County Commission regarding lowering level of pond has been forwarded to me by my brother Howard Bemis.

In March 1931, the pond was lowered to the 1906 level and to accomplish this, all the new stone work, which had been laid, was broken out; it was my intention to have the pond remain at the original level as we should probably cut no more ice there. In May of the same year, I found that boys had thrown some of the granite blocks back and these I removed.

In spring of 1932 I was in Chicopee, and then removed some planks that boys had put in, trying to raise the pond. Last Oct (1932) I was staying in Springfield for few days and went up to see how things were and found every thing all right. One month ago I wrote my brother that if the pond was higher than it should be, he would probably find the boys had been scrutching down again. Since then I have learned that a woman who lives on the west side of the pond, saw some men or boys dropping what she thought might be bags of sand.

The boys want the pond high enough to give them a swimming place at the upper end and since I am living in Rhode Island, it is pretty hard to keep watch of them. Another cause of higher water is that the City of Chicopee has discontinued the use of the Abby reservoir and that throws an extra 10 in stream of water into the pond.

I will come to Chicopee in a few days and do all I can to get the pond back to the level I intend it to remain at.

That dam was built in 1802 and the construction is much stronger than that of dams built more recently; I do not anticipate any trouble from it, but, as I have said, will be there shortly and endeavor to get the water where it meets with your approval.

Very truly yours

Robert E. Bemis

4/25/33
Mr. Tighe stated they will start drawing down the water tomorrow, 4/26.

October 18, 1950

Park Commissioners
City of Chicopee
City Hall
Chicopee, Mass.

Gentlemen:

In accordance with the provisions of Chapter 253, Section 45 et seq. of the General Laws, Tercentenary Edition, relative to the inspection, condition and safety of the dams of Hampden County, you are hereby advised that your dam located on Bemis Pond has been recently inspected by our Engineer and your attention is called to the following conditions noted and recommendations made by him:

> "Gullies have been washed and worn on both faces and top of the earth section of the dam, and these should be filled and properly graded. Fill should be placed to bring the top of the dam to its proper elevation on either side of the spillway. The upstream concrete spillway wing wall needs repairing. Steel reinforcing is exposed."

Any further information concerning this matter which you may desire will be furnished by this office upon request.

Yours very truly,

COUNTY COMMISSIONERS

By _____
Chairman

_____

_____

Bemis Pond Dam
Chicopee

November 17, 1954 7

Department of Parks & Playgrounds
City of Chicopee
City Hall
Chicopee, Mass.

Gentlemen:

In accordance with the provisions of Chapter 253, Section 45 et seq. of the General Laws, Tercentenary Edition, relative to the inspection, condition and safety of the dams of Hampden County, you are hereby advised that your new dam under construction at Bemis Pond has been recently inspected by our Engineer, and your attention is called to the following conditions noted and recommendations made by him:

> "Settlement of earth fill has occurred adjacent to the faces of the side spillways that were recently constructed. Also, adjacent to the main or center spillway, there is indication of earth fill settlement. The settlement of the fill shows that the earth in these portions of the dam was not properly placed and compacted. Settled earth should be dug out sufficiently deep and until properly compacted fill has been exposed. Excavations thus made should be refilled with moisture controlled material and should be rammed and tamped in thin layers. It is recommended that when the sunken areas have been excavated an inspection prior to replacing of the earth fill be requested by the Park Department."

In regard to the recommendation of our Engineer, kindly contact Mr. George H. McDonnell, County Hydraulic Engineer, at Holyoke 3-3991, so that an inspection may be made of the excavated areas prior to refilling these areas with properly compacted material.

Any further information concerning this matter which you may desire will be furnished by this office upon request.

Very truly yours,

COUNTY COMMISSIONERS

By_____Chairman

_____

_____

April 20, 1955

The Parks & Playgrounds Commission
City Hall
Chicopee, Mass.

Gentlemen:

Our Engineer recently inspected your new dam at Bemis Pond in Szot Park and noted that on the downstream face at the left emergency spillway, just to the right of the concrete construction, the sod has slid and a minor slough has taken place. From our Engineer's report it would appear as if the slough is the result of insufficient compaction of the fill around and close to the concrete wall of the left spillway construction. The recommendation for correcting the condition as noted at the time of inspection is as follows:

"The existing condition should be repaired as soon as possible and the repairs can be done by lowering the pond a few feet in order to dry out the portion of the dam where the slough has occurred. After the soil has dried sufficiently, loose material should be dug out and a proper mixture of clay and sand should be rammed and tamped into the cavity formed by the excavation of the soft material in the slough area. After the cavity has been packed with solid and well tamped material, placed in thin layers so as to guarantee good compaction, the top should be covered with a layer of gravel and then the sod replaced to the original grade. It may be necessary to stake the sod to keep it from slipping until the roots have a chance to grow into the soil, and for the sod sections to interlock."

Your attention is called to the fact that when you draw down the level of the pond for the purpose of making the repair to the slough area, the draw-down rate should be very slow to allow time for the voids in the soil of the dam to become empty of their water content. As has been pointed out previously, you have a type of dam whereby water exists on both sides of the dam and since the dam is constructed of fine grained soil, it is necessary that whenever the pond is drained, the draining take place very slowly in order to allow the water within the dam structure itself to drain out so that the level of the water within the dam will never be very much higher than the water level in the pond.

This is customary practice with your type of structure but it is essential that you be fully acquainted with this condition so that damage to your dam will not occur because of a rapidly receding pond and a remaining high water level within the dam itself.

Very truly yours,

_____
Chairman

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City of Chicopee
Park Commissioners
Parks & Playgrounds Department
City Hall
Chicopee, Mass.

August 26, 1955

Gentlemen:

In accordance with the provisions of Chapter 253, Section 45, et seq. of the General Laws, Tercentenary Edition, relative to the inspection, condition and safety of the dams of Hampden County, you are hereby advised that your dam located at SZOT PARK on BEMIS POND just upstream from Front Street in Chicopee, that is, the original dam at Bemis Pond, has been recently inspected by our Engineer, and your attention is called to the following conditions noted and recommendations made by him:

"This dam was damaged during the flood of August 18th and 19th. Water cascading down the spillway chute jumped the limits of the chute and caused damage to the face of the dam. This damage was prevented from spreading by the use of sand bags. An examination of the dam shows that along the top of the dam near the edge of the top of the front slope of the dam cracks have appeared in the earth. These cracks in places appear to be the result of movement of the sod and loam layer. However, in some sections the cracks appear far enough back from the top of the slope to be of a more serious nature.

"It is recommended that you direct the owners of this dam to draw down the pond behind the dam and to keep this pond drawn down until such time as the spillway chute is altered to correct the condition that caused the water to jump from the chute and damage the face of the dam, until the damaged face has been repaired and the extent of the cracks on the surface of the earth investigated. In view of the run-off experienced in the recent flood, it would be advisable to review the earth embankment of this dam, based upon a run-off condition comparable with the type of storm recently experienced, and then to make additions and alterations to the entire dam structure as necessary, in order to guarantee that the structure will safely stand against a run-off that might even exceed the recent flood flows."

We concur with the recommendations of our Engineer and direct that the water behind this dam be drawn down and remain drawn down until the dam is repaired and altered as necessary, and until plans and specifications outlining the proposed additions and alterations to the dam, as well as the repairs, are filed with this Board and approved.

In drawing down the pond, your attention is called to previous communications wherein it has been recommended that the pond be drawn down slowly in order that water in the voids of the soil of the dam in question, as well as the new dam, will not be drained too fast and thus subject the structures to possible sloughing of the saturated materials.

Any further information concerning this matter which you may desire will be furnished by this office upon request. Our County Hydraulic Engineer will be glad to assist you in making recommendations and in reviewing proposals for the repairs, additions and alterations to the dam.

Very truly yours,

HAMPDEN COUNTY COMMISSIONERS

_____
Chairman

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Registered Mail,
Return receipt requested.

November 25, 1964

City of Chicopee
City Hall
Chicopee, Massachusetts

Att: Park Commissioners

Gentlemen:

In accordance with the provisions of Chapter 253, Section 45, et seq. of the General Laws, Tercentenary Edition, relative to the inspection, condition and safety of the dams of Hampden County, you are hereby advised that your Lower Dam located at Bemis Pond has been recently inspected by our Engineer and your attention is called to the following conditions noted and recommendations made by him.

"This dam was inactive when inspected and apparently has not been active this year. The embankment was found to be in fair condition. If the dam is to be reactivated, the embankment should be improved by the removal of weed growth and the promotion of sod. Stone and gravel surfaced areas would not be altered to obtain a grass growth. Irregularities on the face of the embankment should be graded, loamed and seeded as necessary.

The spillway shaft was found to be satisfactory and the drawdown gate open. At the overflow spillway located to the right of the embankment, the wing wall on the pond side of the dam is spalling badly at the left top and should be repaired if the dam is to be reactivated. Some spalling of concrete was noted on the spillway chute walls as well as on the spillway itself but the spalling is not of a serious nature as yet."

The work as recommended in the report of the County Hydraulic Engineer should be done in 1965 if this dam is to be reactivated. If the gate is to be kept open

and the pond empty, the recommended maintenance work can be delayed for a year or two.

Any further information concerning this matter which you may desire will be furnished by this office upon request.

Very truly yours,

BOARD OF COUNTY COMMISSIONERS

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_____

December 7, 1966

City of Chicopee
City Hall
Chicopee, Massachusetts

Attention: Park Commissioners

Gentlemen:

In accordance with the provisions of Chapter 253, Section 45, et seq. of the General Laws, Tercentenary Edition, relative to the inspection, condition and safety of the dams of Hampden County, you are hereby advised that your Lower Dam located at Bemis Pond has been recently inspected by our Engineer and your attention is called to the following conditions noted and recommendations made by him.

"The embankment and the heavy stone-filled toe were found to be okay. Brush and small tree growth should be cut from the embankment surface particularly at the left section of the embankment both on top and on the downstream face.

The emergency spillway at the right side of the dam was found to be satisfactory. Some concrete erosion was noted at the top of the upstream training wall but this condition is not serious as yet. The emergency spillway chute was in good condition and the concreted rock fill behind the right wall of the chute was okay.

The main spillway shaft was satisfactory. Water level was at the opening in the shaft. The conduit through the embankment was in good condition.

In the opinion of the undersigned, the dam is safe."

Any further information concerning this matter which you may desire will be furnished by this office upon request.

Very truly yours,

BOARD OF COUNTY COMMISSIONERS

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Commonwealth of Massachusetts

COPY

County of Hampden

Springfield, Mass.

Office of the
County Commissioners
50 State Street

William F. Stapleton
Chairman
Ralph P. Walsh
Lloyd E. Frabet

December 4, 1968

City of Chicopee
City Hall
Chicopee, Massachusetts

Attn: Park Commissioners

Gentlemen:

In accordance with the provisions of Chapter 253, Section 45, et seq., of the *General Laws, Tercentenary Edition, relative to the inspection, condition* and safety of the dams of Hampden County, you are hereby advised that your Lower Dam located at Bemis Pond has been recently inspected by our Engineer and your attention is called to the following conditions noted and recommendations made by him.

"The bar rack at the shaft spillway inlet is plugged with debris. T[illegible] material should be removed so that the spillway shaft can function properly and water level controlled to the correct elevation in the pond. On the slope of the embankment towards the pond and in the general vicinity of the spillway shaft, there are a number of tree stumps which should have the root structure killed or the stumps dug out.

The spillway at the right end of the dam and the concrete of the spillway chute below the spillway crest is becoming badly worn and eroded. Maintenance work should be done at these locations. The floor of the spillway chute is becoming quite poor.

The rock fill at the toe of the dam was in satisfactory condition. There were no flashboards on the spillway crest.

All brush growth occurring on the downstream face of the dam should be cleared, particularly from the area of the spillway chute. Weed

COPY

growth on the downstream face of the embankment is quite thick and maintenance work should be done to eliminate this growth and develop a good turf cover. The weed growth on the downstream face is so thick that a proper inspection of the surface of the embankment cannot be made.

The owner should be advised to properly maintain the dam."

The recommendations of the County Hydraulic Engineer should be followed. Brush and debris collecting in front of the spillway opening should be cleared away periodically. The needed improvements to the embankment should be done in 1969.

Any further information concerning this matter which you may desire, will be furnished by this office upon request.

Very truly yours,

BOARD OF COUNTY COMMISSIONERS

_____

_____

_____

Commonwealth of Massachusetts

County of Hampden

Springfield, Mass.

Office of the
County Commissioners
50 State Street

William F Stapleton
Chairman
[redacted]
Lloyd W Frabet
Stephen A. Moynahan

December 17, 1969

City of Chicopee
City Hall
Chicopee, Massachusetts

Attention: Park Commissioners

Gentlemen:

In accordance with the provisions of Chapter 253, Section 45, et seq., of the General Laws, Tercentenary Edition, relative to the inspection, condition and safety of the dams of Hampden County, you are hereby advised that your two dams located at Bemis Park has been recently inspected by our Engineer and your attention is called to the following conditions noted and recommendations made by him.

"Upper Dam

The embankment forming this dam is in fair condition as to it shape. It is a narrow structure and the downstream surface of the embankment between the right spillway and the main spillway is quite rough and steep.

The three concrete spillway structures were noted to be okay although there has been some breaking and deterioration of concrete. This condition has not grown serious as yet to require repairs.

Stoplogs in the main spillway were only at the bottom level of the stoplog slot. Thus, the water level in storage behind the Upper Dam was at almost the same elevation as the water level in storage between the Upper Dam and the Lower Dam.

No debris was observed in any of the spillways. The bar racks which formerly were in the side spillways were removed some time ago based upon safety recommendations.

The foot bridge over the right auxillary spillway has been removed and the one at the left auxillary spillway is quite rotten and is deteriorating.

The toe area of the central portion of the embankment of this dam is partially flooded by water backed up from the pond below.

In the opinion of the undersigned, the dam is safe.

Lower Dam

The dam embankment is in the best condition observed in many years. The turf cover is fair, on many areas. Where the turf is poor or thin, loam, seed and fertilizer, should be applied in the spring of 1970.

Some burrow holes were observed on the dam embankment. What little growth is occurring should be cut again in 1970 and the existing old stumps from which much of the brush growth occurs, should be chemically killed or the stumps should be dug out.

On the day of inspection, water level in storage was low. The lower portal opening of the spillway shaft was operating. The trash rack in front of the opening was relatively clean. The spillway conduit through the embankment was in good condition.

The concrete of the emergency overflow spillway, located at the right side of the dam, is in need of repairs. Repairs should be made particularly where the erosion of the concrete is now so deep that reinforcing steel is exposed. All eroded areas should be thoroughly cleaned, rotten and loose concrete removed, and then proper concrete patching applied.

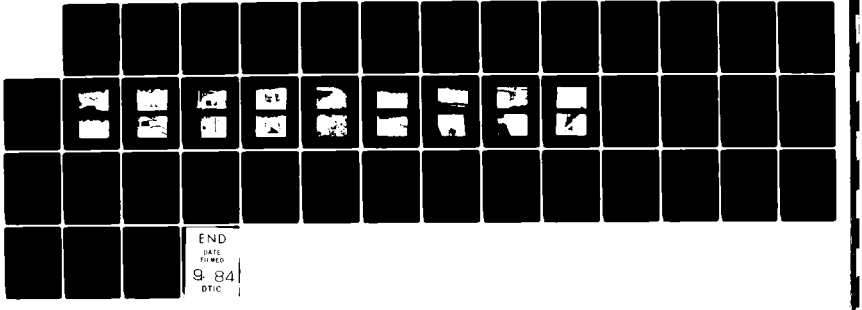
The toe area of the embankment and the rock fill at the toe were noted to be okay.

In the opinion of the undersigned, the dam is safe."

The recommendations of the County Hydraulic Engineer are called to your attention. It would be adviseable for you to improve the turf on the Lower Dam and to make the necessary repairs to the concrete of the emergency spillway.

AD-A145 278 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
UPPER BEMIS POND DAM (..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV OCT 80

UNCLASSIFIED F/G 13/13 NL



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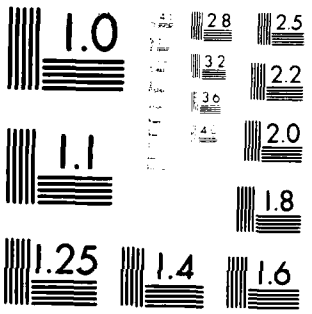

Our Board appreciates the fact that the Lower Dam is in good condition insofar as the embankment turf and surface is concerned. Your attention to the recommendations made by the County Hydraulic Engineer and forwarded to you last year by this Board is appreciated.

Any other information concerning this matter which you may desire, will be furnished by this office upon request.

Very truly yours,

BOARD OF COUNTY COMMISSIONERS

BY: _____

_____

_____

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/Town Chicopee. County Hampden. Dam No. 2-7-61-6.

Name of Dam Szot Park - Bemis Pond "Upper" Dam

Topo Sheet No. 12B. Coordinates: N 419,400, E 304,200.
Mass. Rect.

Inspected by: Harold T. Shumway, On March 16, 1977. Date Last Inspection 4-1-75.

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2. OWNER/S: As of March 16, 1977

per: Assessors____. Reg. of Deeds____, Prev. Insp. X, Per. Contact X.

1. City of Chicopee Park Commissioners, City Hall, Chicopee, Mass.
Name | St. & No. | City/Town | State | Tel. No.

2. _____
Name | St. & No. | City/Town | State | Tel. No.

3. _____
Name | St. & No. | City/Town | State | Tel. No.

---

3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Mr. Armand Fortin
Park & Recreation Dept. Supt., City Hall, Chicopee, Mass.
Name | St. & No. | City/Town | State | Tel. No.

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4. DATA:

No. of Pictures Taken None, Sketches See description of Dam.
Plans, Where City of Chicopee Engineer's Office.

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5. DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor_____.
2. Moderate_____.
3. Severe X.
4. Disastrous_____.

Comments: Approx. 12¼ million gallons impoundment failure could sever Front Street, a major arterial street - area heavily developed.

*This rating may change as land use changes (future development).

6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: approx. center of dam - 5' W. x 11'-4" H. concrete flume spillway with stop log dropwall 7' high.

Controls Yes, TYPE: Stop logs.

Automatic ____. Manual X. Operative Yes X, No ____.

Comments: 5' Wide concrete flume - flow line 19½' below top of dam.

No. 2 Location and Type: 30' from westerly end of dam - concrete overflow side chute spillway.

Controls None, Type: Concrete channel 6' wide - flow line 4' below top dam.

Automatic ____. Manual ____. Operative Yes ____, No ____.

Comments: Condition same as found on last inspection.

No. 3 Location and Type: 30' from easterly end of dam - concrete crest overflow side chute spillway.

Controls None, Type: Concrete channel 6' wide - flow line 4' below top dam.

Automatic ____. Manual ____. Operative Yes ____, No ____.

Comments: Condition same as found at last inspection.

Drawdown present Yes X, No ____. Operative Yes X, No ____.
Comments: Stop logs in main spillway.

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7. DAM UPSTREAM FACE: Slope 2:1, Depth Water at Dam 3'+.

Material: Turf X. Brush & Trees ____. Rock fill ____. Masonry (Conc. Spillways) X. Wood ____.

Other ____.

Condition: 1. Good ____. 3. Major Repairs ____.

2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: Erosion channel in slope at sides of main spillway walls noted in last inspection report still evident but do not appear to have deteriorated any further.

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8. DAM DOWNSTREAM FACE: Slope 2:1.

Material: Turf X. Brush & Trees ____. Rock Fill ____. Masonry (Conc. Spillways) X. Wood ____.

Other ____.

Condition: 1. Good ____. 3. Major Repairs ____.

2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: Erosion channels in slope along side walls of main spillway are somewhat deeper than found at last inspection of 4-1-75.

(9.) EMERGENCY SPILLWAY: Available Yes. Needed ____. 2 spillways

Height Above Normal Water 7 Ft.

Width each - 6 Ft. Height 4' to 5 Ft. Material concrete

Condition: 1. Good ____. 3. Major Repairs ____.

2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: Minor spalling of concrete

(10.) WATER LEVEL AT TIME OF INSPECTION: 14+ Ft. Above ____. Below X.

Top Dam X F.L. Principal Spillway ____.

Other Pond partly drained on day of inspection

Normal Freeboard 11 1/3 Ft.

(11.) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment None found

Animal Burrows and Washouts None found

Damage to Slopes or Top of Dam See items #7 and #8

Cracked or Damaged Masonry Minor spalling of concrete structures

Evidence of Seepage None found

Evidence of Piping None found

Leaks None found

Erosion See items #7 and #8

Trash and/or Debris Impeding Flow None found

Clogged or Blocked Spillway None found

Other

(12) OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed X
3. Conditionally safe - major repairs needed_____
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____

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(13) REMARKS AND RECOMMENDATIONS: (Fully Explain)

Mr. Armand Fortin, Parks & Recreation Department Superintendent, was present during this inspection. The impoundment was partly drained at time of inspection to allow repair work on a culvert under Front Street just downstream of Lemis Pond Lower Dam No. 2-7-61-7.

With exception of routine minor repairs noted during inspection, Dam No. 2-7-61-6 appears to be stable and safe at present time.

HTS/js

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/Town Chicopee. County Hampden. Dam No. 2-7-61-7.

Name of Dam Szot Park - Bemis Pond Lower Dam.

Topo Sheet No. 12B. Coordinates: Mass. Rect. N 419,800, E 304,200.

Inspected by: Harold T. Shumway, On March 16, 1977. Date Last Inspection 8-18-75.

2. OWNER/S: As of March 16, 1977

per: Assessors_____, Reg. of Deeds_____, Prev. Insp. X, Per. Contact X.

	Name	St. & No.	City/Town	State	Tel. No.
1.	City of Chicopee Park Commissioners	City Hall	Chicopee	Mass.	
2.					
3.					

3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name	St. & No.	City/Town	State	Tel. No.
Mr. Armand Fortin Park & Recreation Supt.	City Hall	Chicopee	Mass.	

4. DATA:

No. of Pictures Taken None. Sketches See description of Dam.
Plans, Where City Engineer's Office - 1937 plans for const. of conc. side chute spillway - 1957 plans for reconst. of main spillway.

5. DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor_____.
2. Moderate_____.
3. Severe X.
4. Disastrous_____.

Comments: Approx. 2.7 million gallons impoundment - could sever Front Street - a major arterial street.

*This rating may change as land use changes (future development).

(6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Near center of dam - concrete D.I. to 6'1.7"W. R.C. sluiceway.

Controls Yes, TYPE: Provisions for stop logs on crest of D.I.

Automatic____. Manual X. Operative Yes X, No____.

Comments: 3'X2' opening in pond side of D.I. with grill trash guard - invert of opening 6 1/3' below crest of D.I.

No. 2 Location and Type: Bottom of D.I. - 16" diam. drawdown pipe

Controls Yes, Type: Screw operated gate valve

Automatic____. Manual X, Operative Yes X, No____.

Comments: Gate valve open on day of inspection
Gate valve housing packing leaks badly.

No. 3 Location and Type: Easterly end of dam - 10' W. X 7½'H. conc. crest overflow side chute spillway.

Controls Yes, Type: Provisions for stop logs on crest of spillway.

Automatic____, Manual X, Operative Yes X, No____.

Comments: No stop logs in place - minor spalling on concrete structure

Drawdown present Yes X, No____. Operative Yes X, No____.
Comments: See item #2 above.

(7.) DAM UPSTREAM FACE: Slope 1½:1, Depth Water at Dam 7'+.

Material: Turf X. Brush & Trees____. Rock fill____. Masonry (Conc. Spillway) X. Wood____

Other____.

Condition: 1. Good____. 3. Major Repairs____.

2. Minor Repairs X. 4. Urgent Repairs____.

Comments: Slope has been regraded and reseeded since last inspection of 8-18-75, but vandalism has negated a portion of this work. Concrete structure shows minor spalling.

(8.) DAM DOWNSTREAM FACE: Slope 1½:1.

Material: Turf X. Brush & Trees____. Rock Fill X. Masonry (Conc. Spillway) X. Wood____

Other____.

Condition: 1. Good X. 3. Major Repairs____.

2. Minor Repairs____. 4. Urgent Repairs____.

Comments: Grade somewhat irregular but well turfed over.

9. EMERGENCY SPILLWAY: Available Yes. Needed _____.

Height Above Normal Water 5 Ft.

Width 10 Ft. Height 7½ Ft. Material Reinforced conc.

Condition: 1. Good _____. 3. Major Repairs _____.

2. Minor Repairs X. 4. Urgent Repairs _____.

Comments: Minor spalling and surface cracks noted in side walls of chute channel near downstream end.

10. WATER LEVEL AT TIME OF INSPECTION: 18'± Ft. Above _____. Below X.

Top Dam X F.L. Principal Spillway _____.

Other _____

Normal Freeboard 15'± Ft.

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Brush growth at toe of slope on downstream slope.

Animal Burrows and Washouts None found

Damage to Slopes or Top of Dam See item #7

Cracked or Damaged Masonry Cracks in top of spillway structure holding hand stand. Minor spalling of concrete structures.

Evidence of Seepage Minor seepage noted at toe of slope

Evidence of Piping None found

Leaks Leaks noted through gate valve housing - poor packing?

Erosion See item #7

Trash and/or Debris Impeding Flow None found

Clogged or Blocked Spillway None found

Other _____

(12) OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed X
3. Conditionally safe - major repairs needed_____
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____

(13) REMARKS AND RECOMMENDATIONS: (Fully Explain)

Mr. Armand Fortin, Superintendent of Parks & Recreation, was present during this inspection. The impoundment behind this dam was being drawndown at time of inspection to expedite repair work on a culvert carrying brook under Front Street just a short distance downstream.

Considerable repair work has been accomplished since last inspection of 8-18-75, such as regrading - see item #7, cutting of brush, and other routine repairs.

Several pressure leaks were noted in gate valve housing and the concrete pad supporting the hand stand controls for gate valve on top of D.I. spillway was cracked.

These and other minor areas in need of repairs were brought to the attention of Mr. Fortin during the inspection. Mr. Fortin stated that vandalism damage to upstream slope would be repaired as soon as weather permitted.

Dam appears to be safe at this time.

HTS/js

The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

May 3, 1977

Park Commissioners
City of Chicopee
City Hall
Chicopee, Mass. 01021

RE: Insp. Dam #2-7-61-7
Szot Park-Bemis Pond Lower Dam
Chicopee

Gentlemen:

On March 16, 1977, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be the City of Chicopee. If this information is incorrect will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams-Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is safe; however the following conditions were noted that require attention:

Mr. Armand Fortin, Superintendent of Parks & Recreation, was present during this inspection. The impoundment behind this dam was being drawn down at time of inspection to expedite repair work on a culvert carrying brook under Front Street just a short distance downstream.

Considerable repair work has been accomplished since last inspection of August 18, 1975, such as regrading--see item #7, cutting of brush, and other routine repairs.

Several pressure leaks were noted in gate valve housing and the concrete pad supporting the hand stand controls for gate valve on top of D.I. spillway was cracked.

These and other minor areas in need of repairs were brought to the attention of Mr. Fortin during the inspection. Mr. Fortin stated that vandalism damage to upstream slope would be repaired as soon as weather permitted.

Dam appears to be safe at this time.

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the Dam as indicated above.

Very truly yours,

John J. Hannon, P.E.
Chief Engineer

JJH:eb
cc: Francis J. Hoey, D.H.E.
H. T. Shumway D.D.E.
Al McCallum

The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

July 20, 1977

City of Chicopee
Park Commissioners
City Hall
Chicopee, Mass.

RE: Insp. Dam #2-7-61-6
Szot Park-Bemis Pond "Upper" Dam
Chicopee

Dear Sir:

On March 16, 1977, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be City of Chicopee. If this information is incorrect will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is safe; however, the following conditions were noted that require attention:

Minor spalling of concrete structures, this should be corrected.

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the Dam as indicated above.

Very truly yours,

John J. Hannon, P.E.
Chief Engineer

A/c: bjm
cc: F.J. Hoey, D.H.E.
H. Shumway, D.D.R.E.

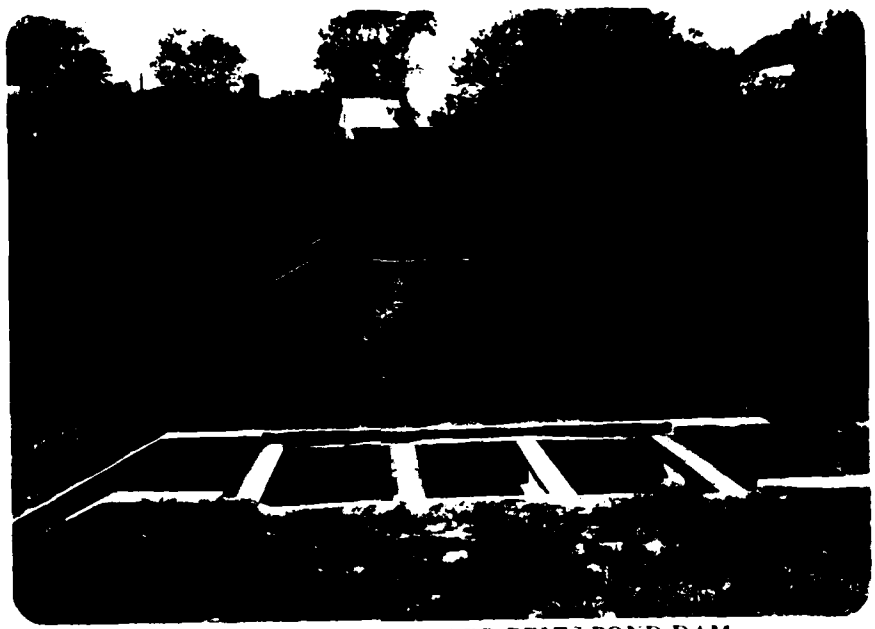
APPENDIX C

PHOTOGRAPHS

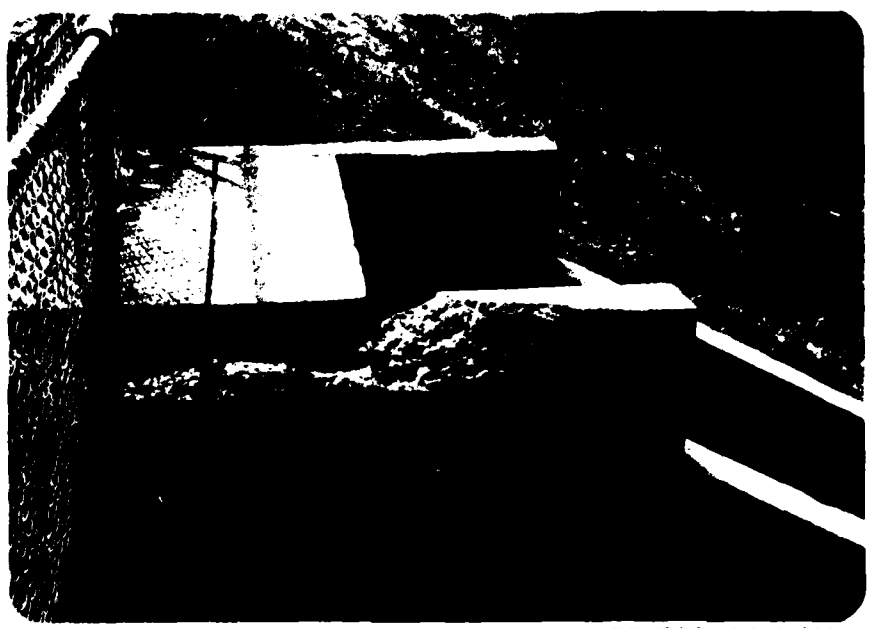
Note: Location and direction of photographs shown in Figure B-1 and Figure B-3 in Appendix B.

NO. 1 UPSTREAM SLOPE OF UPPER BEMIS POND DAM

NO. 2 DOWNSTREAM SLOPE OF UPPER BEMIS POND DAM



NO. 3 CREST OF UPPER BEMIS POND DAM

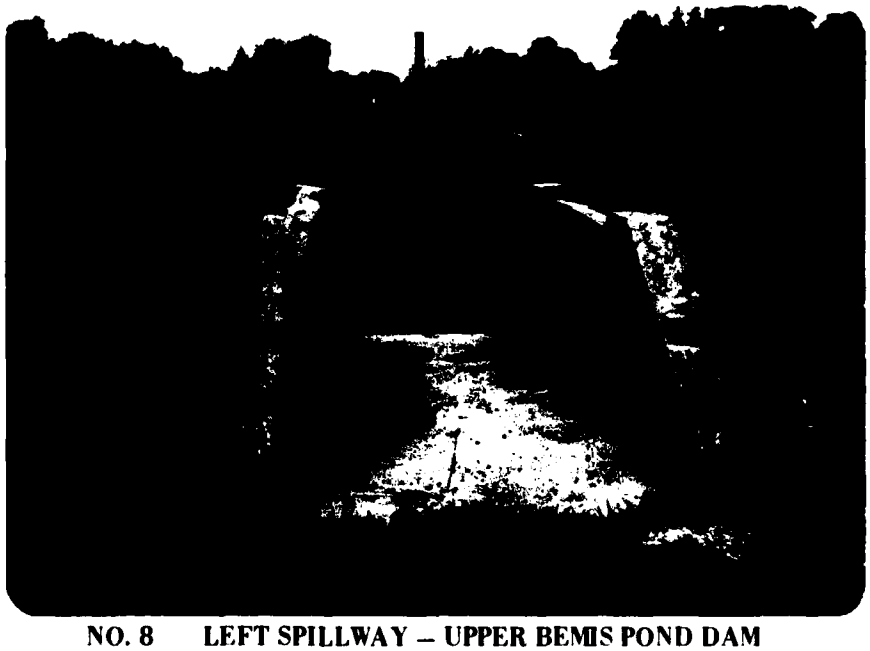


NO. 4 SPALLING OF FLUME WALL UPPER BEMIS POND DAM

NO. 5 UPSTREAM END OF FLUME UPPER BEMIS POND DAM

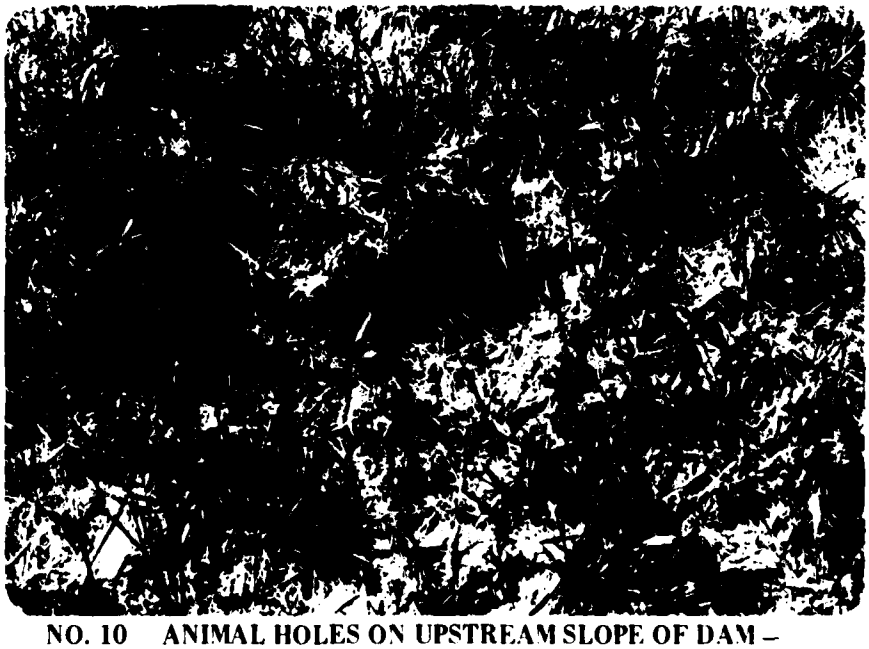
NO. 6 INTERIOR OF FLUME UPPER BEMIS POND DAM

NO. 7 RIGHT SPILLWAY – UPPER BEMIS POND DAM



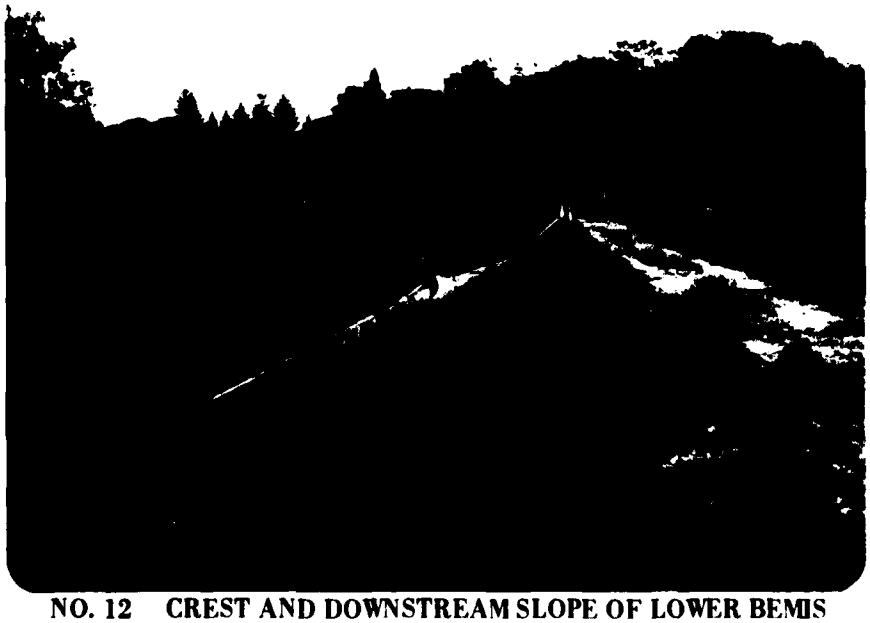
NO. 8 LEFT SPILLWAY – UPPER BEMIS POND DAM

NO. 9 ERODED AREA DOWNSTREAM OF LEFT SPILLWAY – UPPER BEMIS POND DAM



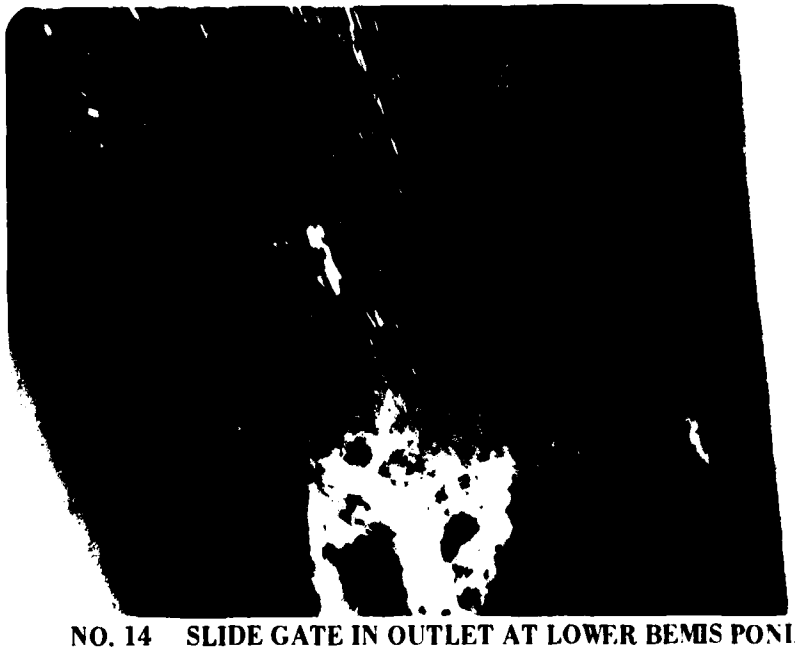
NO. 10 ANIMAL HOLES ON UPSTREAM SLOPE OF DAM – UPPER BEMIS POND DAM

NO. 11 UPSTREAM SLOPE OF LOWER BEMIS POND DAM



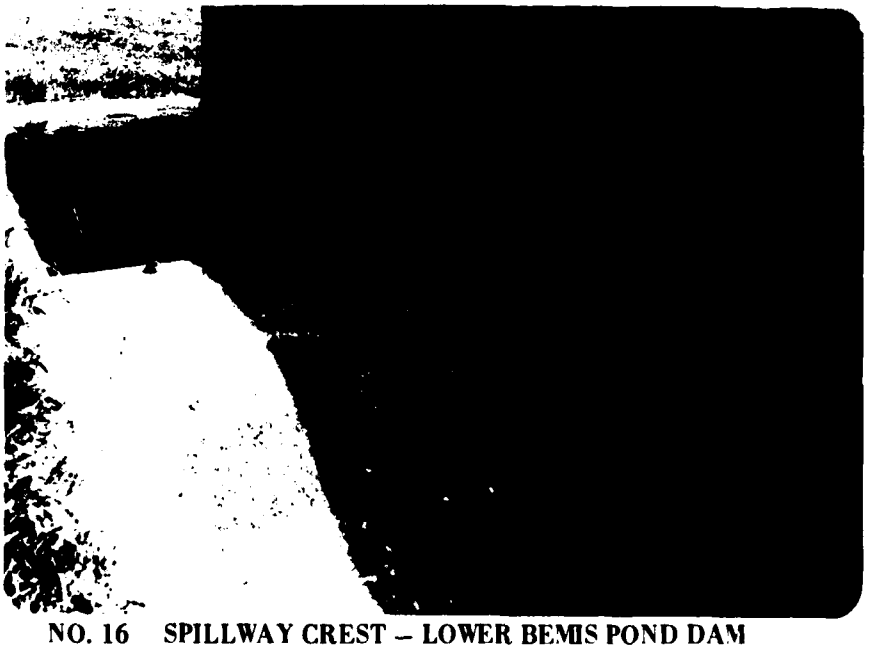
NO. 12 CREST AND DOWNSTREAM SLOPE OF LOWER BEMIS POND DAM

NO. 13 DROP OUTLET AT LOWER BEMIS POND DAM



NO. 14 SLIDE GATE IN OUTLET AT LOWER BEMIS POND DAM

NO. 15 LEFT TRAINING WALL OF SPILLWAY LOWER BEMIS POND DAM



NO. 16 SPILLWAY CREST – LOWER BEMIS POND DAM

NO. 18 DISCHARGE CHANNEL LOWER BEMIS POND DAM

NO. 17 DOWNSTREAM SPILLWAY CHANNEL – LOWER BEMIS POND DAM

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

	Page
Hydrologic and Hydraulic Computations	D-1

Project Nat. Review of Non Fed. Dams Acct No 6928 Page 1 of 18
Subject Hampden County, Mass. Compld By LEE Date 7/31/80
Detail BEMIS (SZOT) DAM - LOWER Ck'd By [illegible] Date 9-8-80

(I) Test Flood, Storage & Storage Function

1 - Total Drainage Area - 1.27 mi²

2 - Pond(s) Area: 0
Swamp(s) Area: 0
Total Area Pond(s) & Swamp(s): 0

% Ponds & Swamps = $\frac{0}{1.27}$ = 0%

3 - $\frac{225 - 119}{9200} = .0115$ } Say Ave Slope = 1.2%

4 - Using C. of E. Curves for Peak Flow Rates & above guide values the Peak Flow Rate was estimated to be between "Flat and Coastal" and "Rolling", and taken at 1650 c.f.s./mi²
Size Class: Small ; Hazard Pot.: High ; Spill. Des. Flood: ½ to Full PMF
Use: Test Flood = ½ PMF

5 - Test Flood Inflow = ½ (1650) 1.27 = 1050 c.f.s.

6 - Pond Storage

See (IV) {
The pond area is sq. mi. at elev. .
Based on a const. area, storage increases at ac. feet per foot of depth increase.

7 - Spillway crest elev. is 118.8, for lowest open outlet

8 - Storage Functions are based on $Q_{out} = Q_{in}\left[1 - \frac{S_{out}}{R}\right]$

See (IV) {
S_{out} = Storage Vol. in Reservoir related to final Q_{out} in terms of inches of rain over the drainage area.
S(in Inches) = 12 D (———) = D ; R = 6hr rain of storm.
D = Storage depth in feet above spillway crest in reservoir

9 - Storage Functions: (Test Flood & ½ PMF - if needed)

F_{TF} = 1050 − 110.5 S	←	—	D
$F_{½PMF} = F_{TF}$	—	S =	— D

(II) Discharge Relations

1 - East side Spillway

Ogee crest @ el. 126.9, ± 10' wide, assume no side contr.
Over head deck with bot. at ± el. 135
$Q_1 \cong 4(10) H^{1.5}$

Res El.	128	130	132	134	131
Q_1	50	220	460	760	330

2 - Central Spillway - crest control (incl. orifice)

20' of crest - less 1.9' trash rods - less ± 3' side contr. ≈ 15' net length
$Q_{2A} = 4(15) H_{2A}^{1.5} = 60 H_{2A}^{1.5}$, Crest el. 125.3
Orifice 2.4' x 3.5' wide, inv. el. 118.8, ℄ el. 120.0, H_{2B} = Res. El. - 120.0
$Q_{2B} = 8.4(0.6)\sqrt{2g H_{2B}} = 41.1\sqrt{H_{2B}}$

Res El.	128	130	132	134	131	122	125
H_{2A}	2.7	4.7	6.7	8.7	5.7	—	—
Q_{2A}	270	610	1040	1540	820	—	—
Q_{2B}	120	130	140	150	140	60	90
ΣQ_2	390	740	1180	1690	960	60	90

3 - Central Spillway - pipe control #1

L = 88.3', A = 6' x 7' = 42 ft², R = 1.615', n = .015, el. ℄ exit = 109.0
El. "A" (in shaft) − 120.0 = $H_3 = \frac{V^2}{2g}\left[0.5 + 1.0 + 88.3(53.5 \times 10^{-6})2g\right] = Q^2(15.9 \times 10^{-6})$

Q	390	740	960	1180
H_3	2.4'	8.7'	14.6'	22.1'
El. "A"	122.4'	128.7'	134.6'	142.1'

(II) Discharge Relations - (Cont.)

4 · Central Spillway - pipe control #2

$L = 88.3 + 18.1 = 106.4'$; $H_4 = \text{Res El.} - 109.0 = \frac{V^2}{2g}\left[0.5\left(\frac{42}{137}\right)^2 + 3 + 1064(53.5\times10^{-6})2g\right]$

$H_4 = \frac{V^2}{2g}(3.414) = Q_4^2(30.1\times10^{-6})$; $Q_4 = 182.27\, H_4^{1/2}$

Note: Orifice flow no longer w/ free disch. Head diff. assumed small & its flow too insignif. to include in this analysis.

Res El.	128	129	130	131	132
H_4	19	20	21	22	23
Q_4	790	820	840	850	870

(III) Low Level Outlet

16"ϕ outlet ; $\mathcal{E}$ el. 111.0 ; short re-entrant orifice ; ±3' long

$C_0 \simeq 0.5$, $Q = 0.5(1.40)\sqrt{2gH} = 5.60\sqrt{H}$

Res. @ el. 118.8, lower to 117.8 - ave $H = 118.3 - 111.0 = 7.3'$

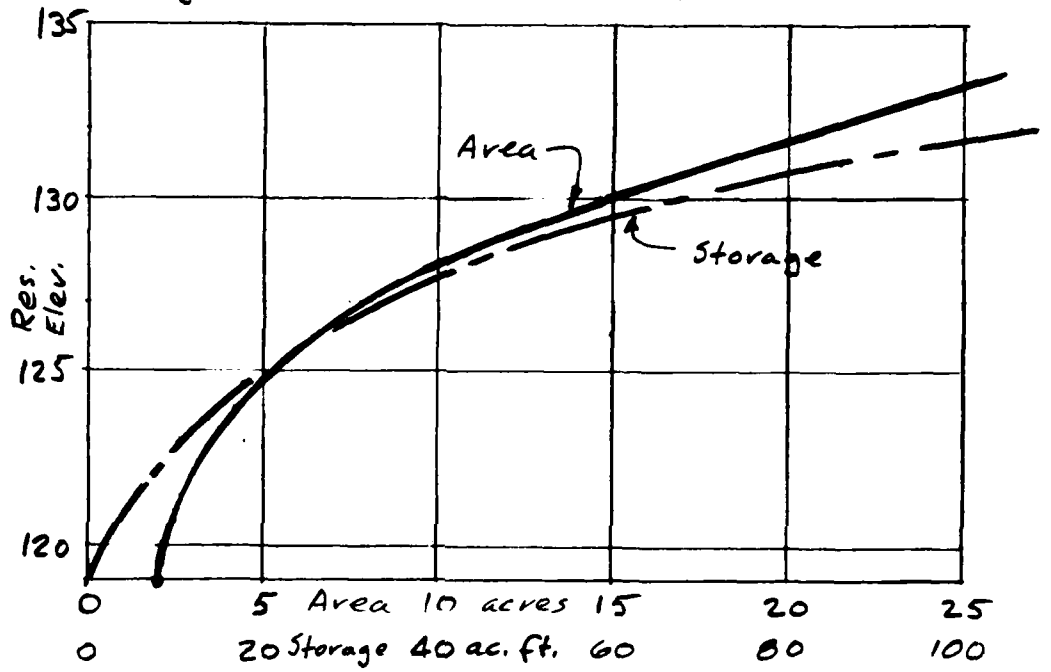
$\bar{Q} = 5.60\sqrt{7.3} = 15$ cfs

Ave. area of pool at el. 118.3 ≃ 2 acres = 87120 ft3/ft

Time to lower 1 ft = $\frac{87120}{15(3600)} = 1.6$ hours

(IV) Reservoir Storage & Value of Storage Function

Res. area is ± 4.1 ac. at el. ± 124 & ±14.7 ac. at el. 130, based on interp. data from U.S.G.S. map. Zero active storage at el. 119± with area of ± 2 acres.

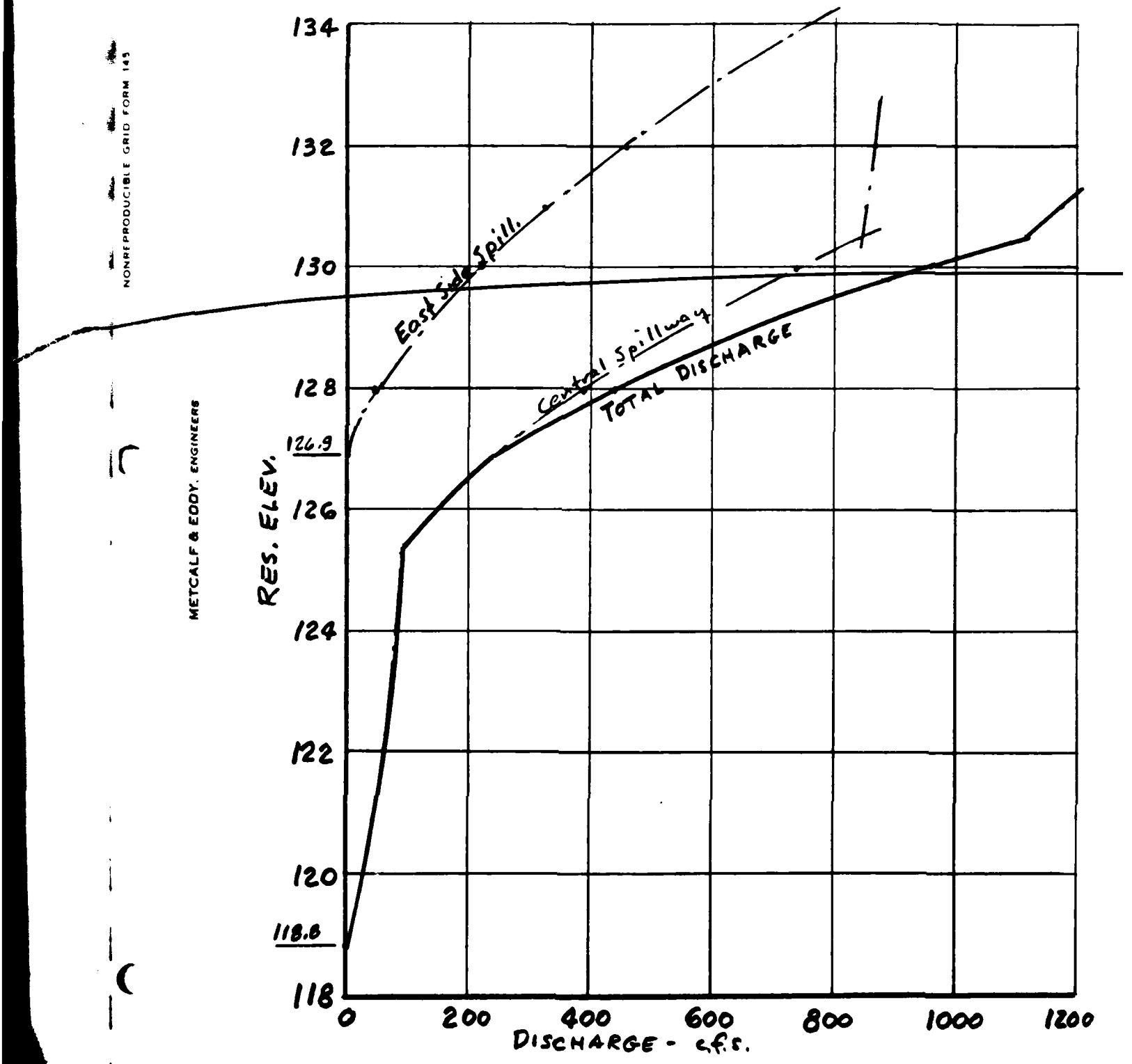


Elev.	Area	ΔVol. (ac.ft.)	ΣVol.	"S" (inches)	F_{TF}
±119	2		0	0"	1050
		10.8			
123	3.4		10.8	.16"	1030
		22.8			
127	8		33.6	.50"	990
		20.3			
129	12.3		53.9	.80"	960
		30.3			
131	18		84.2	1.24"	910
		19.6			
132	21.2		103.8	1.53"	880

$$S' = \frac{\text{Stor. Vol. (12)}}{\text{D.A.}} = \frac{\text{Stor. Vol. (12)}}{1.27(640)} = .01476\,(\text{Stor Vol.})$$

Project Nat. Review of Non Fed. Dams Acct No 6928 Page 5 of 18
Subject Hampden County, Mass. Compld By LEB Date 9/4/80
Detail BEMIS (SZOT) DAM - LOWER Ck'd By [illegible] Date 9-8-80

(V) Discharge vs Res. Elev.

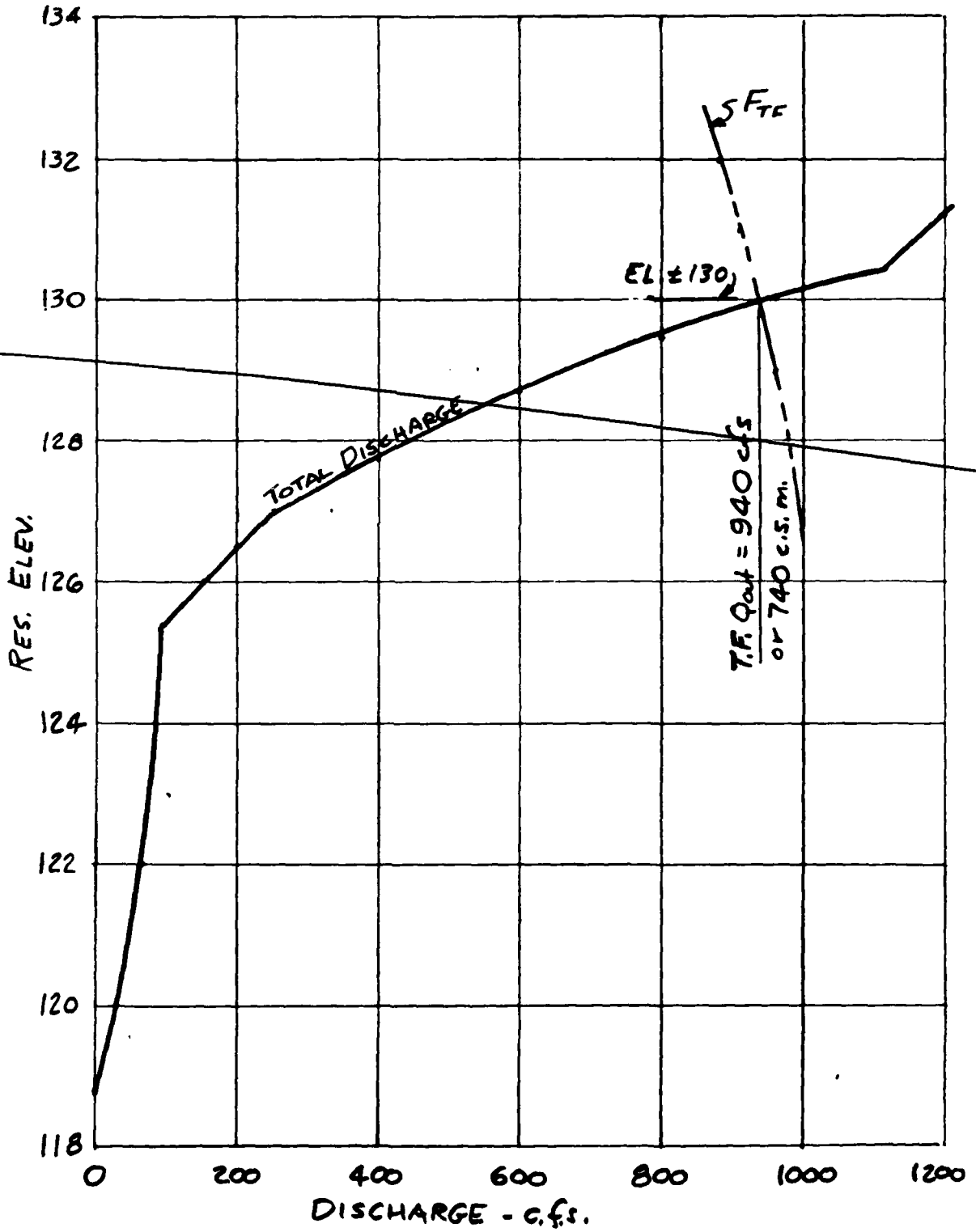


NONREPRODUCIBLE GRID FORM 145

METCALF & EDDY, ENGINEERS

Project Nat. Review of Non Fed. Dams Acct No 6928 Page 6 of 18
Subject Hampden County, Mass. Comptd By LEB Date 9/4/80
Detail BEMIS (SZOT) DAM - LOWER Ck'd By [illegible] Date 9-8-80

(VI) Discharge & Storage Function vs. Reservoir Elevation



NONREPRODUCIBLE GRID FORM 145

METCALF & EDDY, ENGINEERS

(VIII) Failure of Dam

Peak Failure Flow:

Pond Elevation - 130 peak test flood elev
Toe Elevation — 103.6
Y_o = 26.4'

Dam Length Subject to Breaching = 93' (bet. spill.'s at el. ±120)
W_o = 40%(93) = 37'

$$Q_{P_1} = 1.68\, W_o\, (Y_o)^{1.5} = 1.68(37)(26.4)^{1.5} = 8430 \text{ cfs}$$

Continuing Spill. Disch.: (spill.'s stop bef. peak)
Peak Failure Flow: 8430 cfs

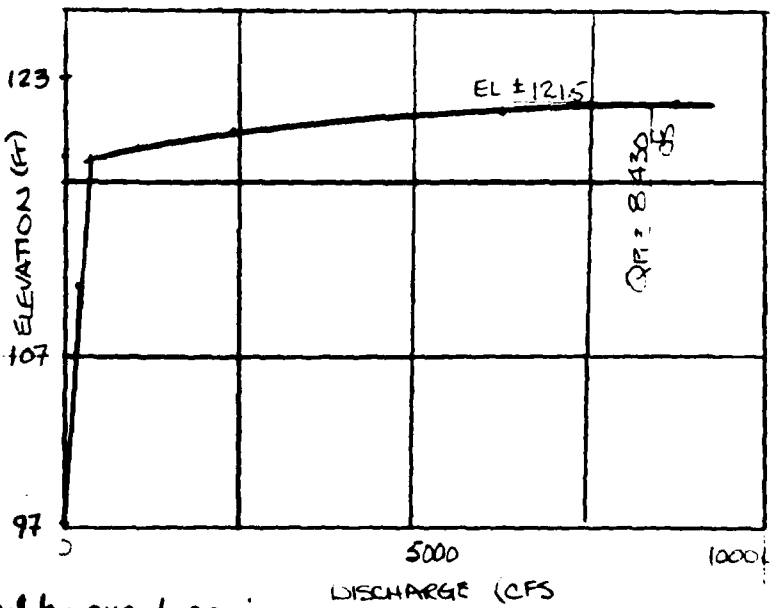
Storage Volume Released:

Storage Above Spillway - See (IV)	=	67 ac ft
Storage Below Spillway $\frac{1}{3}(15.4)2$	=	10 " "
Total Storage		77 " "

Channel Hydraulics:
Flow controlled by a 42" ϕ culvert under Front St. Invert of culvert at EL 97.1
Low point of road at El 118.7

EL.	Q (CFS)
97.1	0
111.1	140
118.7	400
120	2390 *
121	6176 *
2215	8770 *

Flow overtops roadway by ± 2.8'



* Culvert flow diminished by overtopping flow which forms high T.W. - Q_{cul} 0 when road overtops

Project NAT REV of NORTH ... Acct No 16928 Page 8 of 16
Subject HAMPDEN COUNTY, MASS Comptd By M NOWAK Date 9-9-80
Detail BENIS (SZOT) DAM, LOWER Ck'd By LEE Date 10-2-80

CHANNEL HYDRAULICS - controlled by a 42" ϕ culvert running underneath Front St
Invert elevation of 471

EL	H (FT)	Q (CFS)
98.9	1.8	16
99.2	2.1	22
99.9	2.8	36
100.6	3.5	55
101.5	4.4	70
102.4	5.3	85
104.1	7.0	110
107.6	10.5	140
111.1	14.0	170
118.7	21.6	200

- H is the water surface elevation above the bottom of the culvert

- based on fig 17-30, p 418 from Open Channel Hydraulics by Ven Te Chow

The existing culvert is ... consider ... Water will flow over the road; estimate this as weir flow

$Q = 2.5 L H^{1.5}$

EL	H (FT)	L (FT)	Q (CFS)
120	1.3	520	1970
121	2.3	625	5560
121.5	2.8	675	8060

- low point of road is at 118.7

NONREPRODUCIBLE GRID FORM 145
METCALF & EDDY, ENGINEERS

(VIII) Test Flood, Storage & Storage Function

1- Total Drainage Area - 1.25 mi²

2- Pond(s) Area: 0 mi²
Swamp(s) Area: 0
Total Area Pond(s) & Swamp(s): 0

% Ponds & Swamps = $\frac{0}{1.25}$ = 0%

3- $\frac{225-125}{8300} = .01205$ } Say Ave Slope = 1.2%

4- Using C. of E. Curves for Peak Flow Rates & above guide values the Peak Flow Rate was estimated to be between "Rolling" and "Flat & Coastal" and taken at 1650 c.f.s./mi²
Size Class: Small ; Hazard Pot.: High ; Spill. Des. Flood: ½ to Full PMF
Use: Test Flood = ½ PMF

5- **Test Flood Inflow = ½ (1650) 1.25 = 1030 c.f.s.**

6- Pond Storage
The pond area is sq. mi. at elev.
Based on a const. area, storage increases at ac. feet per foot of depth increase.
See (VII)

7- Spillway crest elev. is 119.5 - top stoplogs & 115.2 - top mud sill

8- Storage Functions are based on $Q_{out} = Q_{in}\left[1 - \frac{S_{out}}{R}\right]$

See (XII)
S_{out} = Storage Vol. in Reservoir related to final Q_{out} in terms of inches of rain over the drainage area.

S(in Inches) = $12\,D\left(\frac{\quad}{\quad}\right)$ = D ; R = 6hr rain of storm

D = Storage depth in feet above spillway crest in reservoir

9- Storage Functions: (Test Flood & ½ PMF - if needed)

$F_{TF} = 1030 - 108.4\,S$	$= \quad - \quad D$
$F_{½PMF} = F_{TF}$	$- \quad S = \quad - \quad D$

(IX) Discharge Relations

1- Central Sluice - no stoplogs - no backwater effect

± 4.6' wide ; Assume Critical depth at top of mudsill, elev. ± 115.2

$Q = (\frac{2}{3}E)\,4.6\,(\sqrt{2g\tfrac{2}{3}E}) = 14.2\,(E)^{1.5}$

Res El.	116	120	125	130	132	134	131	133
Sp. En. = E	0.8'	4.8'	9.8'	14.8'	16.8'	18.8'	15.8	17.8
Q_1	10	150	440	810	980	1160	890	1070

2- Central Sluice - stoplogs to el. 119.5 - no backwater effect

$Q = 3.33\,(4.6)\,H^{1.5} = 15.32\,H^{1.5}$

Res El.	120	125	130	132	134	131	133
H_2	0.5	5.5	10.5	12.5	14.5	11.5	13.5
Q_2	10	200	520	680	850	600	760

3- West Spillway - no backwater effect

Rounded crest at el 128.7, 7' wide

$Q = 3.8\,(7)\,H_3^{1.5} = 26.6\,H_3^{1.5}$

Res El.	130	132	134	131	133
H_3	1.3	3.3	5.3	2.3	4.3
Q_3	40	160	320	90	240

4- East Spillway - no backwater effect

Rounded crest at el. 128.8, 7.1' wide, 12" beams across top & bot el. ± 131.9, beams affect flow when res. > el. 107 ±

$Q = 3.8\,(7.1)\,H_4^{1.5} = 26.98\,H_4^{1.5}$

Res El.	130	132	134	131	133
H_4	1.2	3.2	5.2	2.2	4.2
Q_4	40	150	320	90	230

(IX) Discharge Relations (Cont.)

5 - Crest Flow - no backwater

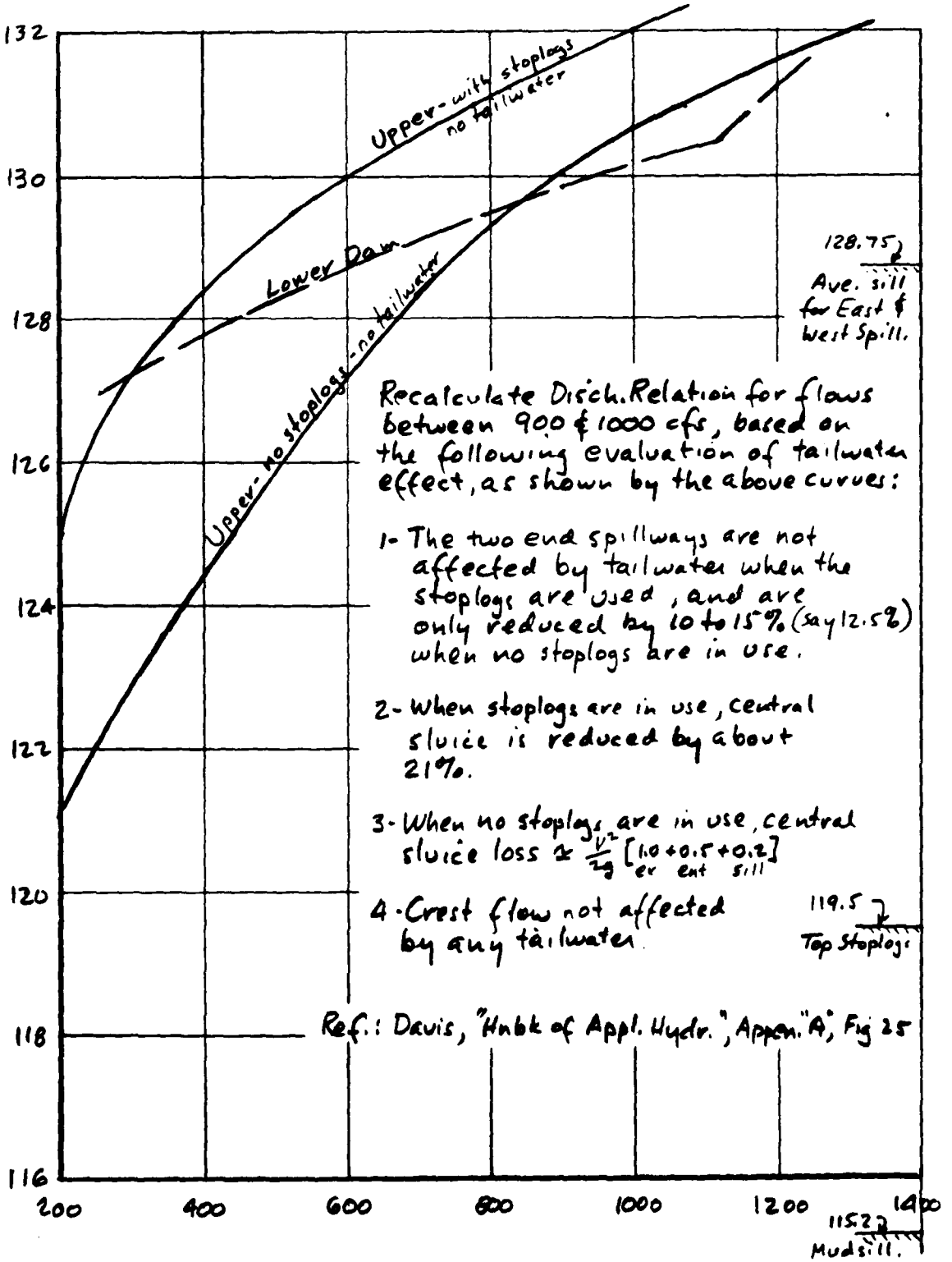
9'@ 131.6, 8'@ 132.1, 340'@ 132.8± ; $q = 2.55\ h^{1.5}$

Res. El.	132	133	134
Q_1	10	40	90
Q_2	—	20	50
Q_3	—	80	1140
ΣQ	10	140	1280

6 - Total Discharge - no backwater - with & without stoplogs

Res El.	120	125	130	131	132	133	134
Q_2	10	200	520	600	680	760	850
Q_3			40	90	160	240	320
Q_4			40	90	150	230	320
Q_5					10	140	1280
WITH STOPLOGS → ΣQ_A	10	200	600	780	1000	1370	2770
$Q_1 - Q_2$	140	240	290	290	300	310	310
WITHOUT STOPLOGS → ΣQ_B	150	440	890	1070	1300	1680	3080

(X) Tailwater Effect



Recalculate Disch. Relation for flows between 900 & 1000 cfs, based on the following evaluation of tailwater effect, as shown by the above curves:

1- The two end spillways are not affected by tailwater when the stoplogs are used, and are only reduced by 10 to 15% (say 12.5%) when no stoplogs are in use.

2- When stoplogs are in use, central sluice is reduced by about 21%.

3- When no stoplogs are in use, central sluice loss $\propto \frac{V^2}{2g}$ [1.0 + 0.5 + 0.2] (exit, entr, sill)

4- Crest flow not affected by any tailwater.

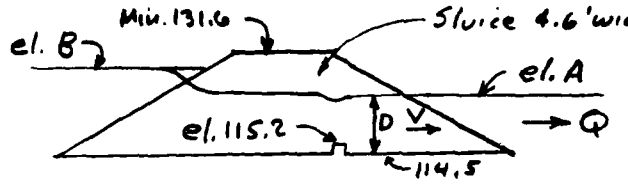
Ref.: Davis, "Hnbk of Appl. Hydr.", Appen. "A", Fig 25

(XI) Recalculated Discharge Relations

A - With Stoplogs

Res El.	130	131	132	133
Q_3+Q_4	80	180	310	470
$0.79(Q_2)$	410	470	540	600
Q_5	-	-	10	140
ΣQ_A	490	650	860	1210

B - No Stoplogs



Note: For end spill, use ave. sill el. 128.75
$\therefore Q_E = 3.8(7+7.1)(.875) H_E^{1.5}$
Ave reduct. for tailwater
$\therefore Q_E = 46.9 H_E^{1.5}$

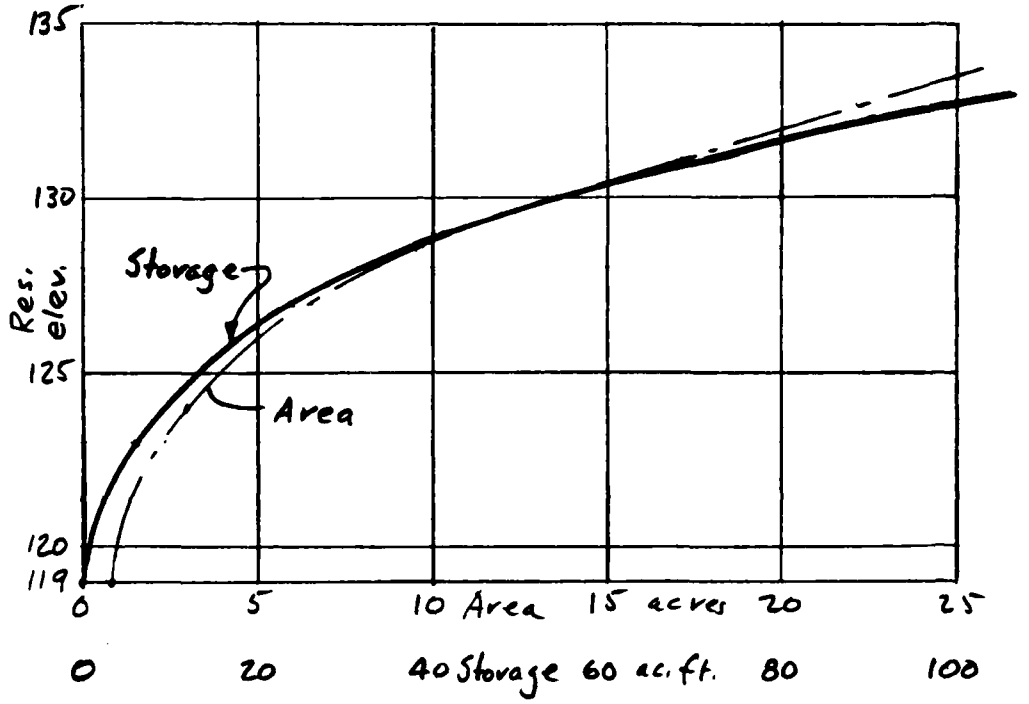
Losses: Ent. @ 0.5, Exit @ 1.0, Sill @ 0.2 – all times $\frac{V^2}{2g}$

Start with el. A & Q_L from Lower dam disch. rating
Add 2 end spill. - & any crest flow based on el. B Adjust assumed "V" until total Q_U calc. equals Q_L for Lower dam

Q_L	el. A	D	V (est.)	h_v sluice	h_L sluice	el. B	Q_A (sluice)	Q_E (end ss)	Q_C (crest)	ΣQ	
800	129.5	15	9	1.2	2.1	131.6	620	230	—	850	high
"	"	"	8.8	1.2	2.0	131.5	610	220	—	830	still high
"	"	"	8.5	1.1	1.9	131.4	590	200	—	790	close enough ←
900	129.85	15.35	9	1.2	2.1	132.0	640	220	10	870	high
"	"	"	8.9	1.2	2.1	131.9	630	270	0	900	←
1000	130.15	15.65	9	1.3	2.1	132.3	650	310	20	980	low
"	"	"	9.1	1.3	2.2	132.3	660	320	20	1000	←

(XII) Reservoir Storage & Value of Storage Function

Res. area is ± 3 acres at el. ± 124 and ± 13.6 acres at el. 130, based on interp data from U.S.G.S. map. Zero active storage at el. ± 119 with area of ± 0.9 acres

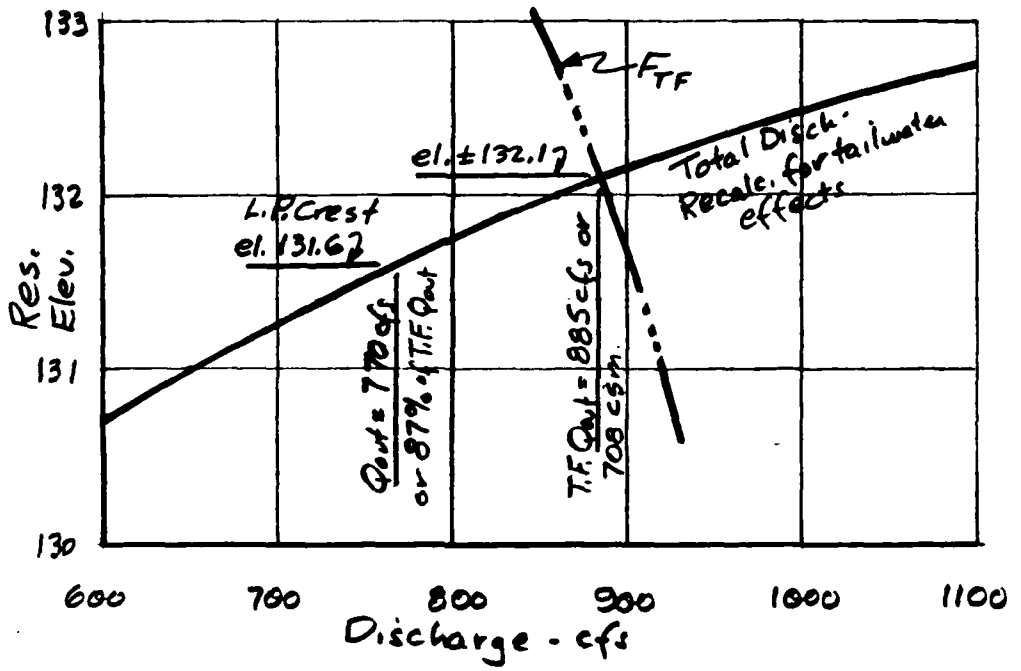


Elev.	Area	Δ Vol. (ac.ft.)	Σ Δ Vol.	"S" (inches)	F_{TF}
± 119	0.9		0	0	1030
		6.4			
123	2.3		6.4	0.1	1020
		17.8			
127	6.6		24.2	0.36	990
		17.1			
129	10.5		41.3	0.62	960
		27.5			
131	17		68.8	1.03	920
		18.5			
132	20.1		87.3	1.31	890
		21.7			
133	23.3		109.0	1.63	850

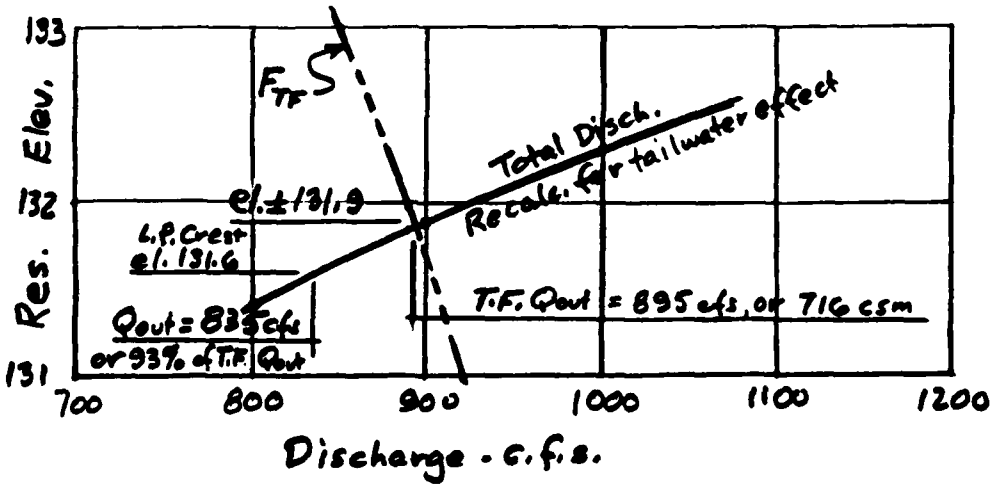
"S" ≈ .015 (Stor. Vol.)

(XIII) Discharge & Storage Function vs. Reservoir Elevation

A - With Stoplogs



B - No Stoplogs



(XIV) Test Flood Crest Flow

A - With Stoplogs

Test Flood Eleu. - 132.1
Low Pt. on Crest - 131.6
Max. Head 0.5 feet

Crest Flow - cfs/ft. = $q = 2.55(0.5)^{1.5} = 0.9$ cfs/ft

Where flow is critical: $y_c = 0.3$ ft.; $V_c = 3.1$ fps

B - No Stoplogs

Test Flood Eleu. - 131.9
Low Pt. on Crest - 131.6
Max. Head 0.3 feet

Crest Flow = 0.4 cfs/ft.

Where flow is critical: $y_c = 0.2$ ft.; $V_c = 2.4$ fps

(XV) Low Level Outlet

Description: Central sluice has stoplogs to el. 119.5. Assume top one foot is removed & critical depth occurs over remaining stoplogs. $y_c = \frac{2}{3}$ spec. Energy; $\frac{V_c^2}{2g} = \frac{1}{3}$ spec. Energy; width = 4.16'; $Q = 14.2\,E^{1.5}$

Water Eleu	119.5	119.0	118.5
Gross Head = Spc. Energy = E	1	0.5	0
Q	14.2	5.0	0

Ave. Q over 12" range = $\frac{1}{2}\left[\left(\frac{14.2+5.0}{2}\right)+\left(\frac{5.0+0}{2}\right)\right] = 6.0$

Area Res @ el. 119 ≃ 0.9 acres

Time to lower water 12" = $\frac{43560(0.9)}{3600(6)} = 1.8$ hours or 109 min.

Project Nat. Review of Non Fed. Dams Acct No 6928 Page 17 of 18
Subject Hampden County, Mass. Compld By LEB Date 9/5/80
Detail BEMIS (S20T) DAM - UPPER Ck'd By [illegible] Date 9-8-80

(VI) Failure of Dam - with Stoplogs to El. 119.5

Peak Failure Flow:

Pond Elevation - 132.1 } Test Flood Conditions
Tailwater Elevation — 129.8 }

Y_o = 2.3'

Dam Length Subject to Breaching = 87' (west of Cent. Silica)

$W_o = 40\%(87) = 35'$

$Q_{P_1} = 1.68\, W_o\, (Y_o)^{1.5} = 1.68(35)(2.3)^{1.5} \cong$ 200 cfs

Continuing Spill. Disch.: 885 cfs
Peak Failure Flow: 1085 cfs

Storage Volume Released:

Storage [illegible] @ el. 132.1 = 88 ac. ft.
Storage [illegible] @ el. 130.2 = 58 " "
Total Storage Change = 30 ac. ft

Channel Hydraulics:

Failure increases flow toward lower dam. Using (V), level behind lower dam rises from el. 129.9 (Q = 885 cfs) to el. 130.2 (Q = 1085 cfs), a total of 0.3 feet.

Note: Without stoplogs pond el. is 131.9, and Y_o = 2.1'
Q_{P_1} = 180 cfs. Results are less but too similar to above to warrent further analysis, considering the approximation already involved.

(XVIII) Failure of Dam - Sluice Stoplogs @ el. 128.7 - or higher

Peak Failure Flow:

Pond Elevation - 128.7 (crest West Spillway)
Toe Elevation — 114.5
Y_o = 14.2'

Dam Length Subject to Breaching = 87'
W_o = 40% (87) = 35

$$Q_{P_1} = 1.68\, W_o\, (Y_o)^{1.5} = 1.68\,(35)\,(14.2)^{1.5} = 3150 \text{ cfs}$$

Continuing Spill. Disch.: 0
Peak Failure Flow: 3150 cfs

Storage Volume Released:

Storage ~~Above Spillway~~ at el. 128.7 = 38 ac. ft.
Storage ~~Below Spillway~~ at el. *127.5 = 28 " "
Total Storage Change = 10 ac. ft

*Assume no disch. from Lower Dam. Stor. @ el. 127.5 = 38 ac ft for Lower Dam

Channel Hydraulics:

No "channel" involved. Failure flow fills pool between dams. Based on that pool being empty before failure, and no discharge from the lower dam, the pool level could rise from el. 110.3 (inv. of low level outlet) to el. 127.5, a rise of 17.2 feet in ± 5 minutes.

APPENDIX E

INFORMATION AS CONTAINED IN THE
NATIONAL INVENTORY OF DAMS

UPPER BEMIS POND DAM
LOWER BEMIS POND DAM

NOT AVAILABLE AT THIS TIME


DAT
ILM